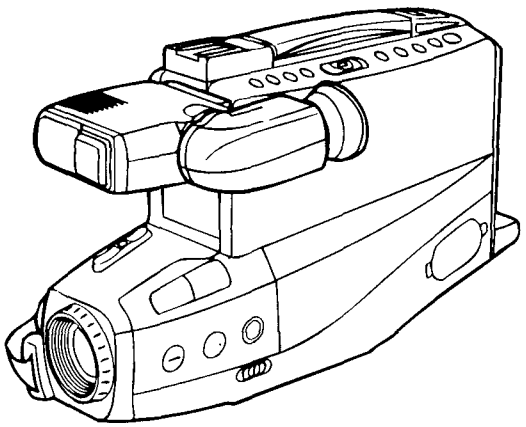
HITACHI

SERVICE MANUAL



V19628

TK | No.6703E

VM-7380E

AC Adapter/Charger VM-ACV23E

PCF-9 MECHANISM

This model uses a PCF type mechanism. When servicing the mechanism, use this manual with the PCF-9 Mechanism Service Manual (No. 6704E). (This manual includes the new exploded view in Chapter 4.)

VHS

This video deck is a VHS type video recorder. For proper operation, only the VHS type cassette must be used.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

VIDEO CAMERA/RECORDER

November 1997 Image & Information Media Systems Division, Tokai

CAUTION

Lithium battery; danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacuturer's instructions.

When replacing the lithium battery it is important to use the same type and connect it correctly.

WARNING:
- Lithium batteries contain dangerous chemicals.
- Handle and dispose of with great care.
- Do not throw in a fire.
- Do not short circuit it.
- For disposal place in a plastic bag and put in waste bin.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts have special safety-related characteristics. These are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for a higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual. Electrical components having such features are identified by marking with a ⚠ on the schematics and the parts list in this Service Manual. The use of a substitute replacement component which does not have the same safety characteristics as the HITACHI recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards. Product safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current HITACHI Service Manual. A subscription to, or additional copies for, HITACHI Service Manual may be obtained at a nominal charge from HITACHI SALES CORPORATION.

CAUTION (CRT EVF)

Be careful of the section painted in white on the electronic viewfinder circuit board as it generates a high voltage.

X-RAY RADIATION

The primary source of X-ray radiation in this viewfinder is the picture tube. The tube used in this viewfinder is specially constructed to limit X-ray radiation emission. For continued X-ray radiation protection, the replacement tube must be same type as the original, Hitachi approved one.

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CHAPTER 1 GENERAL INFORMATION

1. SPECIFICATION

■ General

Power requirements	9.6V DC
Power consumption	7 watts (in the manual focus mode)
Operating temperature	0°C to 40°C
Operating humidity	< 80%
Storage temperature	–20°C to 60°C
Dimensions	108 (W) x 213 (H) x 334 (D) mm
Weight	2.0 kg

■ Video recorder section

Format	VHS
Record/playback system	2 video record/playback heads plus one flying erase head
Video signal	PAL colour & CCIR monochrome signals 625 lines
Tape speed	23.39 mm/sec.
Recording time	240 minutes with an E-240 cassette (SP)
Video output	1.0 Vp-p, 75 ohm
Video input	1.0 Vp-p, 75 ohm
Mic input	– 68 dBs, more than 1K ohm
Audio output	– 7.8 dBs (316 mVrms), less than 1 kohm
Audio input	– 7.8 dBs (316 mVrms), less than 47 kohm
Fast forward/rewind time	Less than 8 minutes with E-180 cassette

■ Camera section

Scanning	625 lines/50 fields/25 frames
Required minimum illumination	0.3 lux
Camera device	1/4" CCD
Lens diameter	46 mm
Viewfinder	2/3" B/W

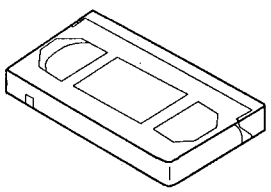
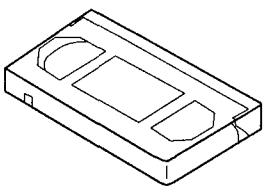
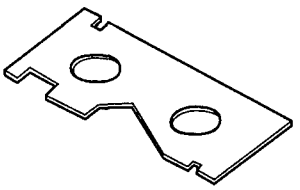
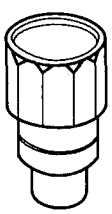
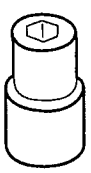
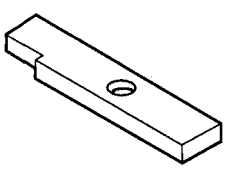
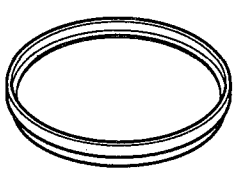
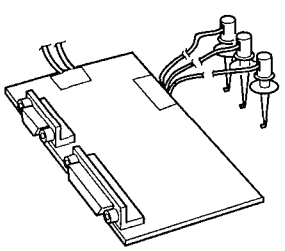
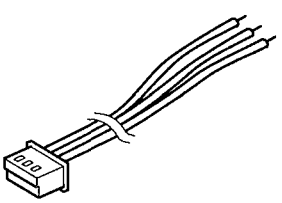
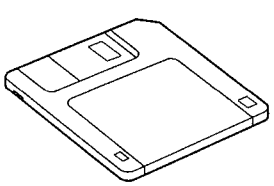
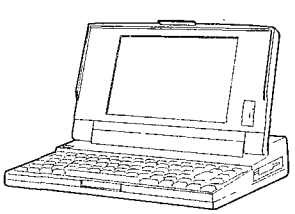
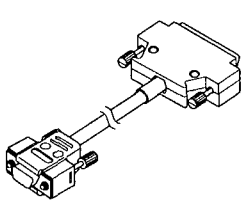
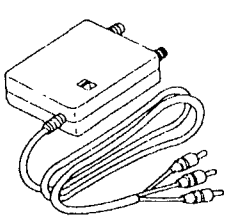
2. COMPARISON WITH PREVIOUS MODEL

ITEM		VM-2980E(AU)/(AV)	VM-7380E(AU)/(AV)
GENERAL	Power Requirements	9.6V DC	
	Power Consumption	7 watts (in the manual focus mode)	
	Dimensions (W x H x D)	108 x 213 x 334 mm	
	Weight	2.0kg	
VIDEO RECORDER SECTION	Format	VHS	
	Record/Playback System	2 video record/playback heads plus a flying erase head	
	Video Signal	PAL colour & CCIR monochrome signal 625 lines	
	Tape Speed	23.39mm/sec.	
	Video Input	1.0Vp-p, 75 ohm	
	Video Output	1.0Vp-p, 75 ohm	
	Audio Input	-7.8dBs (316mVrms), less than 47 k ohm	
	Audio Output	-7.8dBs (316mVrms), less than 1 k ohm	
	Fast Forward/Rewind Time	Less than 8 minutes with E-180 cassette	
	Head Wheel	62mm	
	Basic Chassis Type	PCF-7	PCF-9
CAMERA SECTION	Scanning	625 lines/50 fields/25 frame	
	Required Minimum Illumination	1 lux	0.3 lux
	Camera Device	1/4" C.C.D	
	Lens Diameter	46mm	
	Zoom Ratio/Aperture	12 : 1 (4.0 - 48.0mm)	16 : 1 (4.0 - 64.0mm)
	Aperture	F1.6	F1.4
FEATURES	Electronic Viewfinder (EVF)	2/3" B/W (CRT)	
	White Balance	AI/Fuzzy automatic white balance	
	PAL/PAL60 Switch	No (Auto. select)	
	PAL/MESECAM Switch	No (Auto. select)	
	INST. ZOOM Function	Yes (x 1.5)	
	Electrical Zoom Function	Yes (x 100)	Yes (x 130)
	Autofocus System	Video AF System	
	Program AE (Shutter Speed)	Yes (Programe AE only)	
	Fade	Yes	
	Manual Focus	Yes (Auto/Manual selective)	
	Titler	Yes (1 Page + Auto. title)	
	DC Camera Ligth	Built-in	
	Wind Switch	No (Automatic compensate)	
	MIC MIX Switch	No	
	AV OUTPUT/INPUT Jack	US-pin jack (Input/Output selective)	
	EXT. Microphone Jack	Yes	
	Earphone Jack	No	
ACCES-SORY	AC Adapter/Charger	VM-ACV22E	VM-ACV23E
	Battery Pack	VM-BP66	
	AV Output Cable	Monaural Type (Parts No. EW10942)	

3. COMPARISON OF MAIN CCONTROL ICs

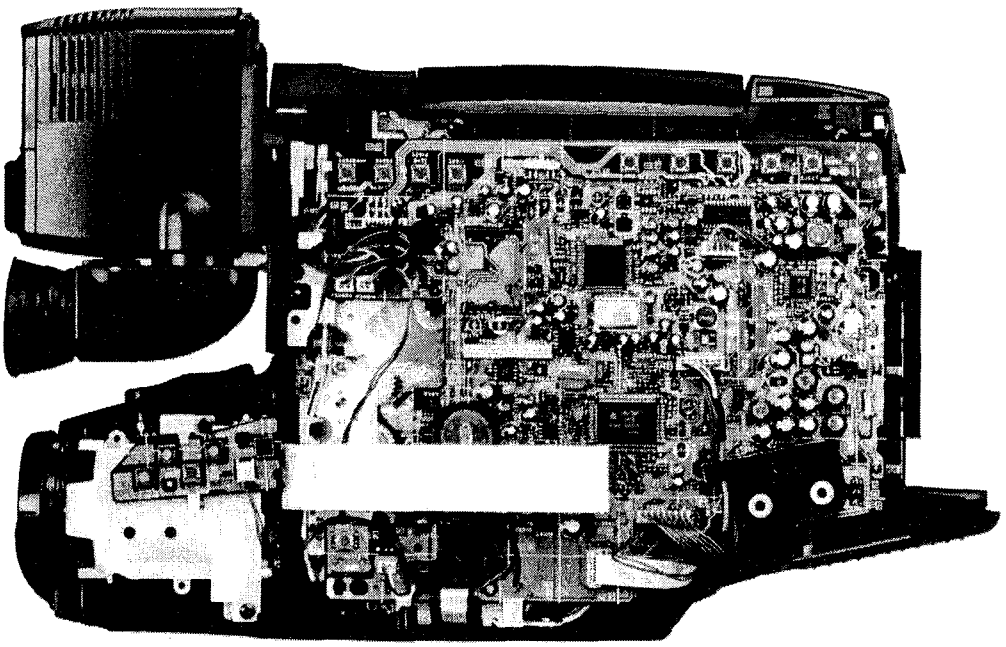
	ITEM	VM-2980E(AU)/(AV)	VM-7380E(AU)/(AV)
CAMERA (AUTOFOCUS)	CCD Sensor	MN37210FE (IC1001)	MN37112FP (IC1001)
	CDS/AGC	HA118184F (IC1101)	
	A/D CONV.	HTS9620A (IC1102)	HD49319A (IC1102)
	DSP		HG51CS035TEA (IC1103)
	Drive Pulse Generator	µPD16510GR (IC1104)	
	D (Digital) -µP	HD6433042T15F (IC1106)	HD6433042ST31F (IC1106)
	EEPROM	MX25S67MR (IC1107)	
	F Det./Iris Drive	UPC5023GS-105 (IC1201)	
	Zoom Motor Driver	MPC17AT85VM (IC1301)	µPD16833G3 (IC1301)
	Focus Motor Driver	MPC17AT85VM (IC1302)	
EVF	Video Amp/Vertical & Horizontal Deflection	HA118121T (IC2001)	
SYSTEM CONTROL (POWER) & SERVO	Main µP	HD6433974SA71F (IC901)	HD6433974SB53F (IC901)
	Reg./Volt. Det	S84206F (IC902)	
	Level Shift	HD74HCT125T (IC903)	SN74AHCT125PW (IC903)
	Loading Motor Drive	BA6417F (IC904)	
	Sync Separater	BA7046F (IC905)	
	Cylinder Motor Drive	XLA6458FPY (IC602)	M56747FP (on the cylinder motor)
	Capstan Motor Drive	LB1851 (IC1M on the capstan motor)	
	Switching Regulator	XRA9706K (IC501)	
LUMA/CHROMA & AUDIO	Video/Linear Audio Processor	HA118203NF or NAF (IC201)	HA118203F (IC201)
	Video Head Amp	STV5727 (IC202)	
	Video Amp	µPC5023GS (IC203)	
	CCD Delay	MSM7470-71MS (IC204)	

4. JIGS AND TAPES FOR ADJUSTMENT

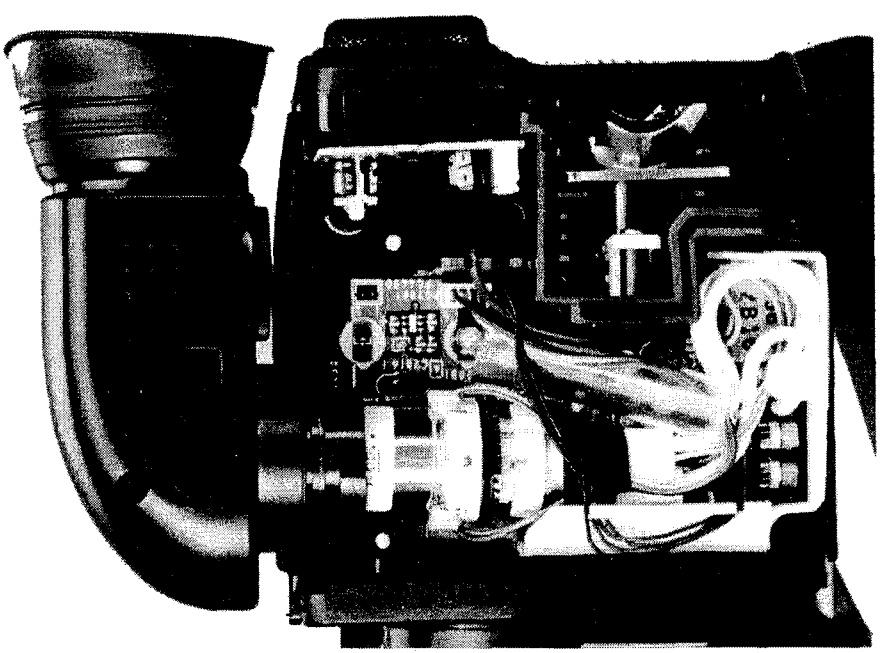
1. BACK TENSION METER No. 7099004 	**2. ALIGNMENT TAPE** MH-2: No. 7099052 		**3. MASTER PLANE** No. 7099279 
4. TORQUE GAUGE No. 7099039 	**5. TORQUE GAUGE ADAPTER** No. 7099204 	**6. REEL DISK HEIGHT JIG** No. 7099038 	**7. HEXAGONAL WRENCH** No. 7099202
8. EXTENSION POWER CABLE No. 7099326 	**9. LIGHT BALANCING FILTER C12 (46mm Φ)** No. 7099369 	**10.DSP-R JIG** No. 7099448 	**11.3-PIN EXTENTION CABLE** No. 7069066 
12.CAMERA ADJST. FLOPPY DISK [New Jig] No.7069196 	**13.PERSONAL COMPUTER** [Goods on the Market] 	**14.PERSONAL COMPUTER 9-PIN or 25-PIN CABLE** [Goods on the Market] 	**15.RF CONVERTER UNIT (VM-RF80E)** [Option] 

5. DIAGRAMS TO BE REFERRED TO DURING DIASSEMBLY, REINSTALLATION AND ADJUSTMENT

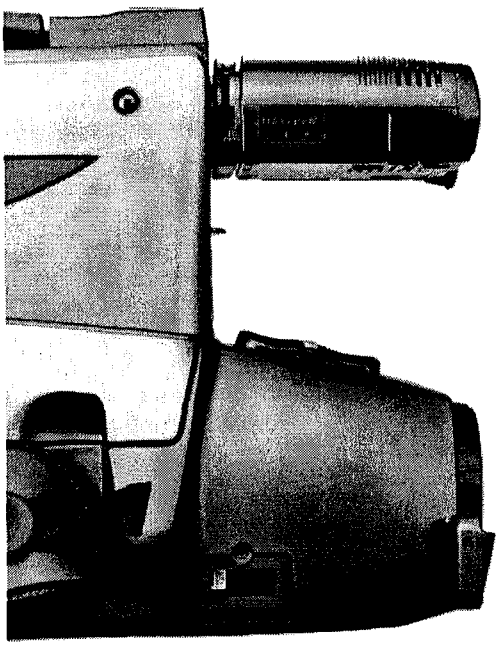
5.1 WIRING LAYOUT ON SPC AND MA CIRCUIT BOARD



5.2 WIRING LAYOUT ON EVF CIRCUIT BOARD



5.3 3-PIN EXTESION CABLE CONNECT ON POINT



6. SERVICE MANUAL ABBREVIATION LIST

A	
ACC	Automatic Color Control
ADD	Adder
ADRS	Address
AF	Automatic focus (Autofocus)
AFC	Automatic Frequency Control
AGC	Automatic Gain Control
AGC KILLER	AGC Killer Voltage
AI	Automatic Intelligence
AIC	Automatic Iris Control
ALC	Automatic Level Conrol
AMP	Amplifier
APC	Automatic Phase Control
ASBL	Assemle (Phase Matching)
AUD.	Audio
AUX	Auxiliary
A/D	Analog-to-Digital Converter
A.DUB	Audio Dubbing
B	
B (BLU)	Color Signal Blue
BATT.	Battery
BF	Burst Flag
BG	Burst Gate or Back Ground
BGP	Burst Gate Pulse
BLK	Blanking
BPF	Bandpass Filter
BUF.	Buffer Amplifier
B-YL	Color Difference Signal B-YL
C	
C (CHROMA)	Chrominance Signal
CAM	Camera
CAPST.	Capstan
CARRI.	Carrier
CATV	Cable TV
C.BLK	Composite Blanking
CCD	Charge Coupled Device
CDS	Correlated Double Sampling
CG	Character Generator
C.FG (CFG)	Capstan Frequency Generater
C.FREE RUN	Capstan Free Run
CH (Ch or ch)	Channel
CHARA.	Character
CHD	Camera Horizontal Drive Pulse
C.MEMORY	Counter Memory
CNR	Chroma Noise Reducer
COM.	Common
COMPA.	Comparator
COMPE.	Compensator
COMP-EXP	Compressor-Expander
COMPO	Composite
CONT.	Control
CONV.	Converter
COUNT.	Counter
CP	CP
C.PAUSE	Camp Pulse
C/R	Capacitor/Resistor
C.RESET	Countor Reset or Camera Reset

C	
C.REVERSE	Count Reverse
CS	Communication Signal
CST	Cassette
C.SYNC	Composite Synchronizing Signal
CTL	Control Track Pulse (Control)
CYL	Cylinder
D	
D (Digital)	Digital
DA	Double Azimuth
D/A	Digital to Analog Converter
D-D	Direct Drive
DEEMPHA.	Deephasis
DEF	Deflefction
DEMOD.	Demodulator
DET	Detector
DIFF. AMP	Differential Amplifier
DISP.	Display
DL	Delay Line
DO	Dropout
DOC	Dropout Compensator
DSP	Digital Signal Processor
D/W	Dark/White
D.ZOOM (DZ)	Digital Zoom
E	
EAROM (EA-ROM)	Electrically Alterable Read Only Memory
EEPROM (EEP-ROM)	Electrical Erasable Proframmed
E-E	Electronic-to-Electronic
EIS (E.I.S.)	Electronic Image Stabilizer
EMPHA. (EMPH)	Emphasis
EQ	Equalizer
ESS	Supply End Sensor
EST	Take-up End Sensor
EVF	Electronic Viewfinder
EXT.	External
E.ZOOM	Electronic Zoom
F	
F.ADV	Frame Advance
F/V	Frequency-to-Voltage Converter
FB	Feed back
FE	Full Erase
FF (F/F)	Flip Flop
F.FWD	Fast Forward
FG	Frequency Generator
FM	Frequency Modulation
FREQ.	Frequency
fsc	Sub Carrier Frequency
FWD	Forward
G	
GEN.	Generator
GND	Ground
H	
H (HORIZ.)	Horizontal
HB	Hi-Band

H	
HBF	Horizontal Burst Flag
HD	Horizontal Drive
Hi-Fi	High Fidelity
HPF	High-pass Filter
I	
IF	Intermediate Frequency
INDI.	Indicator
INST.	Instant
INT.	Internal
INV.	Inverter
I/O	In/Out (Input/Output)
IR	Infrared Rays
L	
LB	Low-Band
LCD	Liquid Crystal Dissplay
LIN.	Linear
LM	Loading Motor
LNC	Line Noise Canceller
LOG	Logarithm
LP	Long Play
LPF	Low-pass Filter
LUMA	Luminance
L/R	Left/Right
M	
MAN	Manual
M.BRAKE	Main Brake
M.CUT	Monitor Cut
MEM.	Memory
MIC	Microphone
MIX	Mixer
MMV	Monostable Multivibator
MOD.	Modulator
M.STATE	Mechanism State
M.STOP	Memory Stop
N	
NEG	Negative
NFB	Negative Feed Back
NOR. (NORM)	Normal
NR	Noise Reduction
O	
OB	Optial Black
OSC	Oscillator
OSD	On-Screen Display
P	
PB (PLAY)	Playback
PG	Pulse Generator
PLL	Phase Locked Loop
POS.	Positive
PROG.	Program
PROT.	Protector
PWM	Pulse Width Modulation
R	
R (RED)	Color Signal Red
RAM	Random Access Memory
REC	Record
RECT.	Rectifier

R	
REF.	Reference
REG.	Regulator
REV	Review
REW	Rewind
RF	Radio Frequency
ROM	Read Only Memory
RSS	Supply Reel Sensor
RST	Take-up Reel Sensor
R-YL	Color Difference Signal R-YL
S	
SAW	Sawtooth Signal
SC1 (0°)	3.58MHz Subcarrier Signal 1 (0-degree Phase Shifted)
SC2 (90°)	3.58MHz Subcarrier Signal 2 (90-degree Phase Shifted)
SEPA. (SEP)	Separator
S/H	Samle and Hold
SP	Standard Play or Speaker
S.REEL	Supply Reel Sensor
SRCH	Search
SRV	Servo
STABI.	Stabilizer
S.TRACK	Slow Tracking
STBY	Standby Mode
S-VHS	Super VHS
SW	Switch
SW30Hz (15 or 25Hz)	30Hz Head Switching Pulse (15 or 25Hz Head Switching Pulse)
SYNC	Synchronizing signal
SYS.CON	System Control
T	
T (TELE)	Telephoto Angle
T.BRAKE	Take-up Brake
TP	Test Point
T.REEL	Take-up Reel Sensor
TRS	Transfer
V	
V (VERT.)	Vertical
V.AGC	AGC Voltage
VCO	Voltage Controlled Oscillator
VD	Vertical Drive
V.DUB	Video Dubbing
VHS	Video Home System
VOL.	Volume
VP	Voltage Pulse
VCXO	Voltage Controlled Crystal Oscillator
W	
W (WIDE)	Wide Angle
WHT	Color Signal White
WHD	Wide Horizontal Drive
WHT BAL.	White Balance
Y	
Y	Luminance Signal
Y/C	Luminance/Chrominance
YEL (Ye)	Color Signal Yellow
YL	Luminance Signal (Low Component)

7. LEADLESS (CHIP) COMPONENT IDENTIFICATION

7.1 Leadless Transistor

The part name of a leadless transistor is indicated by a code on its surface, using one letter, one letter and one numeral,two letters, two letters and one numeral, two numerals, two numerals and one letter, three letters, or four letters.

Note: There are transistors with the same code but different part names, or with the same part name but different codes. Refer to the parts lists to finally identify a transistor.

CODE	PART NAME	CODE	PART NAME
Leadless (Chip) Transistor			
3925	2SC3925	BQ	2SB709A
1CQ	2SCB902	BR	2SC4081R
1D	2SC3127	BR	2SC2412K
1DS	2SD1328S	BR	2SC4617
1DT	2SD1328	BS	2SC2412K
1R	2SB970TX	C-7	2SA811
2BQ	2SK374PQ	C1G	KSC1623
2BR	2SK374QR	CB	2SC3646
2Y	2SC3757	CC	2SA1122C
2YQ	2SC4691	CC	2SC3647T
3N	2SK620	CC	2SC3647
4N	XN5601	CD	2SA1122D
4Q	XN1B301	CE	2SA1122E
4R	XN1C301	CK	2SD999
5C	XN4601	CP	2SC4097
5C	XP4601	CQ	2SC2411K
5H	XP4501	CR	2SB710
5H	XN4501	CR	2SC2411
5K	XP4401	CR	2SB1219
5K	XN4401	D16	2SC1622A
5L	XN5501	D17	2SC1622A
5N	XN6501	D18	2SC1622A
5O	XN6401	DB	2SD1766
5R	XP1501	DE	2SC2463
5R	XN1501	DF	2SD1623
5S	XN1504	DF	2SD1898
5V	XN1401	DG	2SD1624
5W	XN2501	DK	2SB798
5X	XN4504	EC	2SA1022
7R	XN2401	F-2	2SC1009F2
7S	XN1601	F-3	2SC1009F3
AA	2SD1757K	F-4	2SC1009F4
AKQ	2SA1738	FC	2SC2619
AKQ	2SA1806	FR	2SA1774
AL	2SA1791	FR	2SA1037K
AM	2SC4656	FR	2SA1576R
AO	2SB709AQR	FS	2SA1037K
AQ	2SB709AQ	GC	2SC2734
AQ	2SB766	GM	3SD1615
AR	2SB1462	HQ	2SA1036K
AR	2SB766	IC	2SC3016
AR	2SB709ARS	IRD	2SA1484
AR	2SB1218R	IS	2SB792S
AS	2SB766	IT	2SB792T
AS	2SB709AS	L-4	2SC1623L4
B3	2SC1621B3	L-5	2SC1623L5
B4	2SC1621B4	L-6	2SC1623L6
BC	2SB1188	L-6	2SC2812L6
BD	2SB1121	L-7	2SC2812L7
BE	2SB1260	L5	MMBC1623L5
BF	2SB1123	L6	MMBC1623L6
BF	2SB1308	LB	2SC2462B
BG	2SB1124	LC	2SC2462C
BH	2SB1001	LD	2SC2462D

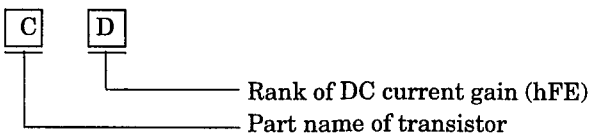
CODE	PART NAME	CODE	PART NAME
Leadless (Chip) Transistor			
LR	2SC2412KLN	T2	IMT2
M-5	2SA812	UD	2SC2404
M-6	2SA1179	ZS	2SD874S
MC	2SA1052MC	VR	2DS968A
MD	2SA1052MC-D	W1	FMW1
N3	2SC1653	W10	FMW10
ND	2SD1306ND	W2	FMW2
NE	2SD1306NE	W3	FMW3
PD	2SA1171D	WR	2SD602
PS	2SD814	X1	UMX1
QB	2SC2520QB	X1	IMX1
QC	2SC2620QC	X2	IMX2
QO	2SC2714	Y1	FMY1
R22	2SC4226	Y12	2SA1464
R22	2SC3356	Y25	NTM3906
R32	2SC4227	Y3	FMY3
R34	2SC3583	YCD	2SK197
R42	2SC3585	YI	2SA1666
RB	2SC2618RB	YQ	2SD601YQ
RC	2SC2618RC	YR	2SD601YR
RK	2SC3357	YR	2SD1819R
S1	FMS1	YR	2SD2216
S2	FMS2	YS	2SD601YS
SC	2SA1121	Z1	IMZ1
SO	2SA1162	Z2	IMZ2
SP	2SC3082K	ZO	2SD874T
T1	IMT1	ZQ	2SD601A
T1	UMT1	ZR	2SD874R
Digital Transistor			
3	DTC143TK	6C	UN9113
4	DTC114TK	6S	NP4113
6	DTC144TK	8B	UN5212
13	DTA143EK	8C	UN9213
14	DTA144EK	8C	UN2213
15	DTA124K	8S	XP4213
15	DTA124EU	9L	XP1213
16	DTA144EU	9L	XN1213
16	XDA144EK	A1	FMA1
16	DTA144EE	A1	UMA1
23	DTC143EK	A2	FMA2
24	DTC114EU	B2	UMB2
24	DTC144EK	B2	IMB2
25	DTC124EU	C2	FMC2
25	DTC124K	C5	FMC5
26	DTC144EE	D2	IMD2
26	DTC144EU	F52	DTB123
26	XDC144EK	G1	FMG1
33	DTA143XK	G2	FMG2
43	DTC143XK	G21	DTD113ZK
52	DTA123YK	G5	FMG5
60	UN511F	H03	DTC343TK
64	DTC114YK	H2	IMH2
80	UN521F	H2	UNH2
4P	XN1A312T	H27	DTC363EK
6B	UN5112	RO4	KSR1104
6C	UN2113	R31	FP1L2Q
FET			
30	2SK621	KB	2SK323
1FQ	2SK321FQ	WS	2SK322T
1FR	2SK321FQR	WT	2SK322T
1KP	2SK316	X15	2SK425
2BQ	2SK663	X4	2SK94
DY	2SK1579	XAF	2SK980FG
JO	2SK208	YC	2SK197YC
K	3SK166	YD	2SK197YD
K4	2SK160K4	YE	2SK197YE
K5	2SK160K5	ZD	2SK217ZD

(1) Identification with two letters

Use this code and the following chart for transistor identification.

Example :

Code	Part name
CD	2SA1122D
LD	2SC2462D

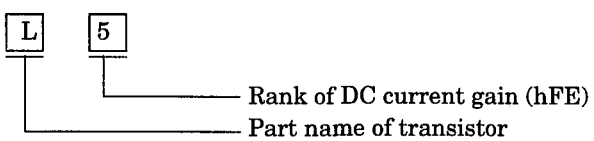


(2) Identification with one letter and one numeral

Use this code and the following chart for transistor identification.

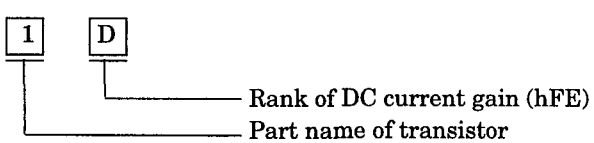
Example :

Code	Part name
L5	2SC1623(5)
L6	2SC1623(6)



Example :

Code	Part name
1D	2SC3127D



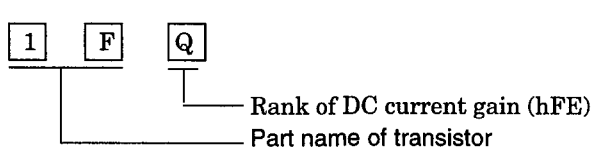
Note: Codes S1,S2,T1,W1,W2,W3,X1,Y1,Y3,Z1 and Z2 encode only the part names.

(3) Identification with one numeral and two letters

Use this code and the following chart for transistor identification.

Example :

Code	Part name
1FQ	2SK321Q

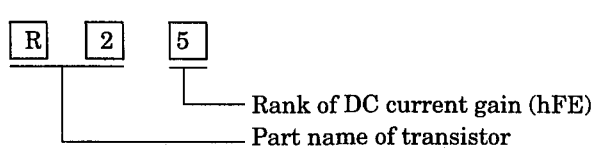


(4) Identification with one letter and two numerals

Use this code and the following chart for transistor identification.

Example :

Code	Part name
R25	2SC3356

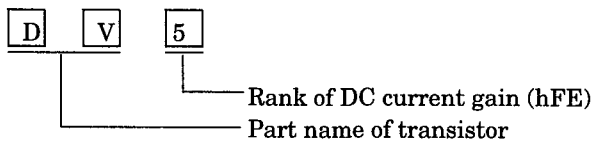


(5) Identification with two letters and one numeral

Use this code and the following chart for transistor identification.

Example :

Code	Part name
DV5	2SD596

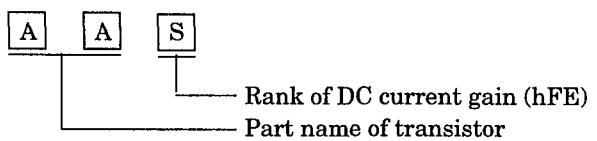


(6) Identification with three letters

Use this code and the following chart for transistor identification.

Example :

Code	Part name
AAS	2SD1757KS



7.2 Leadless Diode

The part name of a leadless diode is indicated by a code on the surface, using one letter and one numeral,two letters, two letters and one numeral, two numerals and one letter, or three numerals. Use this code and the following table to identify the part name of a diode.

Note: Refer to the parts lists to finally identify a diode.

CODE	PART NAME	CODE	PART NAME
Diode			
0	HVU300A	3D	RB715F
1.0	ISV201	3.0L	MA3030L
2.0	MA3020	3.6L	MA3036L
5.1	MA3051L	3.9L	MA3039L
5.1	MA3051M	4.3H	MA3043H
6.8	MA3068	4.3L	MA3043L
6.8	MA3068M	4.3M	MA3043M
7.5	MA3075L	4.7L	MA3047L
8.2	MA3082M	4.7M	MA3047M
9.1	MA3091	5.1H	MA3051H
20	HZM6	5.1L	MA3051L
24	ISV221	5.1M	MA3051M
27	RD2.7M B	5.6M	MA3056M
30	RD3.0M B	6.2L	MA3062L
51	RD5.1M B2	6.2M	MA3062M
56	RD5.6M B	6.8H	MA3068H
91	RD9.1M B	6.8L	MA3068L
102	RD10M B2	6.8M	MA3068M
122	RD12M B2	6.8M	MA3068
163	RD16M B3	7.5H	MA3075H
182	RD10M B2	7.5L	MA3075L
271	RD2.7M B	8A	UN221D
272	D2.7M B2	8.2H	MA3082H
301	RD3.0M B	8.2M	MA3082M
362	D3.6M B2	9.1M	MA3091M
391	D3.9M B1	9.1M	MA3091
512	RD5.1M B2	10L	MA3100L
561	RD5.6M B	10M	MA3100M
621	RD6.2M B1	11L	MA3110L
681	RD6.8M	12M	MA3120M
683	RD6.8M B3	13H	MA3130H
911	RD9.1M B	18M	MA3180M
2.7H	MA3027H	36M	MA3360

CODE	PART NAME	CODE	PART NAME
Zener Diode			
1A	MA110	M3A	MA199
A3	1S2835	MC	MA153
A4	HSM2836C	MC	MA143
A5	1S2837	MH	MA141K
A6	HSM2838C	MH	MA151K
B	SB0505CP	MH	MA152K
B64	SFPB64	MI	MA132K
B74	SFPB74	MN	MA141WA
BE	1SV172	MN	MA152WK
C1	HSM88S	MN	MA132WA
C2	HSM276S	MO	MA152WA
C3	1SS226	MO	MA133
C4	HSM88WK	MP	MA151WK
F7	KV1470	MT	MA141WK
H5	HVM14	MT	MA141WK
J	SB07-03C	MU	MA132WK
K	DA221	MU	MA151WA
M1A	MA159	N	DAN222
M1C	MA158	N	DAN202T
M1M	MA721	NU	MA152WK
M1N	MA713DAT	P	DAP202T
M1P	MA714	S4	DIFS4
M2A	MA122	SA	SB10-05P
M2B	MA123	Z	DA106K

7.3 Leadless Resistor

The resistor value is indicated on its surface, using three numerals, or one letter and one numeral.

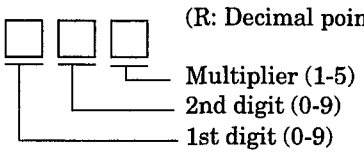
(1) Identification with three numerals

Read this code following the same procedure as when reading the color code on discrete resistors.

Example:

Code	Value
330	33 ohms
561	56 × 10 = 560 ohms
123	12 × (10 × 10 × 10) = 12K ohms
1R2	1 + 0.2 = 1.2 ohms

(R: Decimal point)



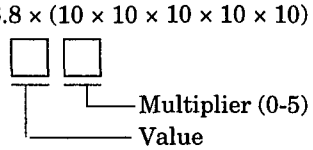
(2) Identification with one letter and one numeral

Use this code and the following chart for resistor identification.

Letter	Value	Letter	Value	Letter	Value
A	1	J	2.2	S	4.7
C	1.2	L	2.7	U	5.6
E	1.5	N	3.3	W	6.8
G	1.8	Q	3.9	Y	8.2

Example:

Code	Value
A1	1 × 10 = 10 ohms
G2	1.8 × (10 × 10) = 180 ohms
L3	2.7 × (10 × 10 × 10) = 2700 ohms
S4	4.7 × (10 × 10 × 10 × 10) = 47K ohms
W5	6.8 × (10 × 10 × 10 × 10 × 10) = 680K ohms



7.4 Leadless Capacitors

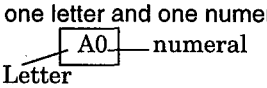
The capacitor value is indicated on its surface, using body color and one letter, or one letter and one numeral.

(1) Identification with body color and one letter

Body Color	Letter	Value	Body Color	Letter	Value
Red	A	1(PF)	Blue	G	180(PF)
	C	2		J	220
	E	3		L	270
	G	4		N	330
	J	5		Q	390
	L	6		S	470
	N	7		U	560
	Q	8		W	680
	S	9		Y	820
Black	A	10(PF)	White	A	0.001(μF)
	C	12		E	0.0015
	E	15		J	0.0022
	G	18		L	0.0027
	J	22		N	0.0033
	L	27		S	0.0047
	N	33		W	0.0068
	Q	39	Green	A	0.01(μF)
	S	47		E	0.015
	U	56		J	0.022
	W	68		N	0.033
	Y	82		S	0.047
Blue	A	100(PF)		U	0.056
	C	120		W	0.068
	E	150		Y	0.082
			Yellow	A	0.1(μF)

Example :	Color	Letter	Value
	Red	A	1PF
	Black	A	10PF

(2) Identification with one letter and one numeral



Letter/Numeral	Value	Letter/Numeral	Value
A0	1(PF)	A2	100(PF)
H0	2	C2	120
M0	3	E2	150
d0	4	G2	180
f0	5	J2	220
m0	6	L2	270
n0	7	N2	330
t0	8	Q2	390
y0	9	S2	470
A1	10(PF)	U2	560
C1	12	W2	680
E1	15	Y2	820
G1	18	A3	0.001(μF)
J1	22	E3	0.0015
L1	27	J3	0.0022
N1	33	N3	0.0033
Q1	39	S3	0.0047
S1	47	W3	0.0068
U1	56	A4	0.01(μP)
W1	68	E4	0.015
Y1	82	J4	0.022
		N4	0.033
		S4	0.047
		U4	0.056
		W4	0.068
		A5	0.1

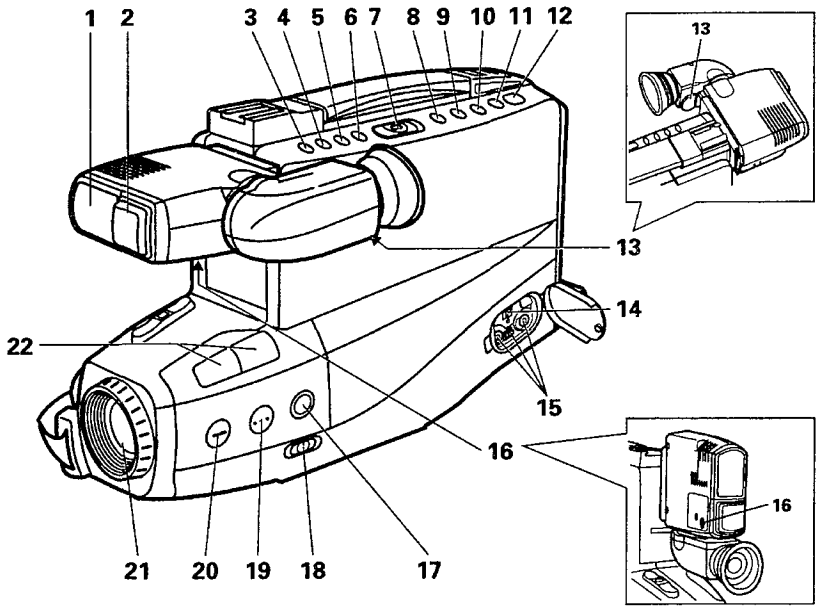
Example :

Letter/Numeral	Value
A0	1PF
A1	10PF

7.5 Leadless Jumper

The leadless jumper indicated as shown below.

CONTROLS AND FUNCTIONS



1. Camera Light
The camera light is turned on or off depending on the position of the LIGHT switch.
NOTE: The camera light turns on only in the record and record pause modes.

2. Microphone
Sensitive to sounds coming from the direction in which the camera is pointed.

3. DISPLAY Button
If this button is pressed, the tape counter, remaining battery power level, etc. appear in the viewfinder and the tape's 0000M position is stored in memory. If the camera/recorder is connected to a TV/monitor receiver, the same display as that in the viewfinder appears on the screen. (See "DISPLAY BUTTON" and "MEMORY" on page 17.)

4. RESET Button
Pressing this button resets the counter to "0000"

5. DATE/TIME Button
Press this button to display the date and time in the viewfinder. Whenever the date and time appear in the viewfinder, they will be recorded on the tape.

6. TITLE Button
Press this button to create and record personalized titles on your videos with the camera/recorder's built-in titler. See page 25.

7. CAM/OFF/VIDEO Switch
This switch changes the camera/recorder to the record mode or to the playback mode.
Press and hold the small button on this switch, then slide it to "CAM" or "VIDEO"

8. DUBBING AUDIO/VIDEO Mode Select Button
This button is used to record new audio in place of existing audio without erasing the video signal or to record new video and audio while erasing the previous audio and video signals.

9. REW/REVIEW Button
Press this button during stop or fast forward mode, and fast-rewinding starts. Press the button during playback of tape, and the tape is played back in the rewind direction approximately 3 times faster than the normal speed to confirm the recorded contents. Press the PLAY button to return to normal playback mode or press the STOP/EJECT button to stop tape movement. Also use this button to review the last few seconds of the tape you are recording. See page 13.
NOTE: You can also visually scan backward when the camera/recorder is in record/pause (stand-by) mode by pressing and holding this button.

10. PLAY Button
Used for playback of tape recorded in the SP mode.
NOTE: When the camera/recorder is in record/pause (stand-by) mode, pressing and holding this button will play the tape at normal.

11. F.FWD Button
Press this button during stop or rewind mode, and fast-forwarding starts. Press the button during playback of tape, and the tape is played back in the forward direction approximately 3 times faster than the normal speed to confirm the recorded content. Press the PLAY button to return to normal playback mode or press the STOP/EJECT button to stop tape movement.
NOTE: You can also visually scan forward when the camera/recorder is in record/pause (stand-by) mode by pressing and holding this button.

12. STOP/EJECT Button
The STOP/EJECT button is used to stop playback, rewind, and fast forward operations. The STOP/EJECT button has no effect during record operation. Press the button in the stop mode to insert or remove the cassette.

13. Diopter Control (on the side of the viewfinder)
To use the electronic viewfinder without eyeglasses on, turn this control for your optimum focus adjustment.

14. "AV OUT/IN" Switch
This switches the AUDIO and VIDEO jacks between the input and output.
When the switch is set to "OUT", the AUDIO and VIDEO jacks can be used as output jacks, and when the switch is set to "IN", they can be used as input jacks. When the AUDIO and VIDEO jacks are used as the input jacks, the input PAL and SECAM (System B & G) signals can be recorded.

15. AUDIO/VIDEO/RF DC OUT Jacks (behind the cover)
AUDIO and VIDEO jacks can be used as input or output jacks depending on the position of "AV OUT/IN" switch.
- When using these jacks as outputs, connect the supplied audio/video cables or the RF converter unit to view a playback picture on a TV.
- Use AUDIO and VIDEO jacks as inputs when you supply signals from another device to your camera/recorder for recording.

16. MIC Jack (under the built-in microphone)
Connect an external microphone (not supplied) here to record sound from the external microphone.
NOTE: Connecting an external microphone automatically switches off the built-in microphone.

17. DIGITAL FADE Button
During recording you can add a professional touch to your recordings by fading in and out of scenes. You can select four fade modes — white fade, wipe fade, zoom fade and black-and-white fade.

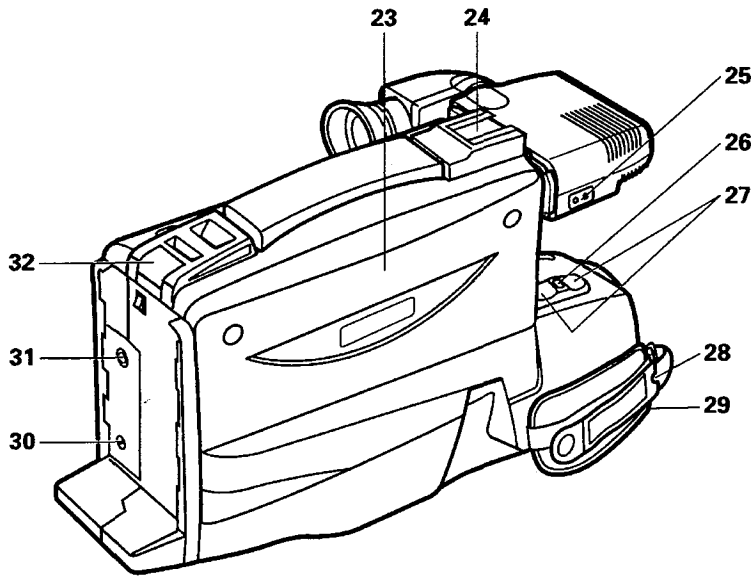
18. Camera Light Switch
This switch is used to turn the built-in camera light on and off. When the switch is in the "AUTO" position, the camera light turns on automatically if the lighting in the area around the subject is insufficient for a clear picture.

19. DIGITAL EFFECT Button
Use this button to add special effects to your recording. You can select five modes — 16X9 mode, negative/positive mode, X130 digital zoom mode, half-mirror mode and mosaic mode.

20. INST. ZOOM (Instant Zoom) Button
Use this button to magnify the image being recorded 1.5 times momentarily.

21. Lens
F1.4 (4~64 mm) 16:1 power zoom lens features with auto focus and auto iris functions.

22. Focus Control Buttons (AUTO/MAN ◀ FOCUS ▶)
Press these buttons simultaneously to select manual or automatic focus. "FOCUS" appears in the viewfinder when you select the manual focus mode by pressing both buttons simultaneously. For manual focusing, press the ◀ or ▶ button to bring the subject into focus.



23. Cassette Holder
Press the STOP/EJECT button in the stop mode to open the cassette holder. Be aware of the cassette direction when inserting.
NOTE: Power source must be connected to open the cassette holder.

24. Accessory Shoe
Used to attach an optional video accessory.

25. BRIGHT and FOCUS Controls
Use to adjust the viewfinder brightness and focusing.

26. REC/PAUSE Button
When this button is pressed during recording, the tape stops and the camera/recorder enters the record/pause (stand-by) mode. When this button is pressed again, the tape runs to resume recording. This button may be also used to display a still picture during playback mode.

27. Power Zoom Switch/TRACKING Control
This switch performs zooming electrically.
"W": Picture becomes wider gradually.
"T": Picture becomes telescopic gradually.
This switch is used as a tracking control during tape playback to adjust for the optimum picture.

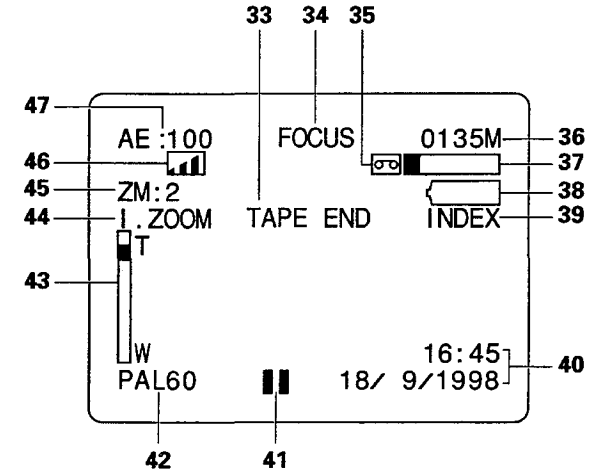
28. Lens Cap Tab
Place the lens cap on this tab when you are ready to record a scene. The tab also prevents the lens cap from swinging around on its cord.

29. Hand Strap
Adjust to best fit to your hand.

30. DC IN 9.6V Jack
When using the AC adaptor/charger, connect one end of the DC cord (provided) to this jack and the other end to "DC OUTPUT" of the AC adaptor/charger. When using the car cord (optional), connect this jack and the car's cigarette lighter socket.

31. S.EDIT Jack
For synchro editing, connect the optional synchro edit cord here.

32. BATTERY EJECT Button
Release the battery attached to the video camera/recorder.



33. TAPE Indicator
When the REC/PAUSE button is pressed, if a cassette without its safety tab is inserted, "TAPE" appears for several seconds.
When the REC/PAUSE button is pressed, if no cassette is inserted, "NO TAPE" appears for several seconds.
When the tape reaches near the end during shooting, "TAPE END" flashes.

34. FOCUS Indicator
This indicator shows when the camera/recorder is set to the manual focusing mode. It lights when the AUTO/MAN FOCUS control buttons are pressed simultaneously.

35. Cassette-in Indicator
Lights when a cassette has been loaded in the camera/recorder.

36. Tape Counter
Shows tape counter in 4-digit number.

37. Time Remaining Indicator
Shows remaining tape in seven steps.

38. Battery Indicator
Indicates the battery condition.

39. INDEX Indicator
See page 20 for details.

40. Date/Time Indicator
Indicate the date/clock during the record or record/pause (stand-by) mode. You can record the clock and/or date with object when recording.

41. Mode Indicator
Indicates the operating modes;
- "REC" appears during the record mode.
- "◀◀" appears during the rewind mode.
- "▶▶" appears during the fast forward mode.
- "II" appears during the record/pause (stand-by) mode.

42. Video System Mode Indicator
Indicates the video system mode.
During recording: Displays "PAL" when a PAL signal is recorded. No display appears when a SECAM siganl is recorded.
During Playback: Displays "PAL" when a tape recorded in the PAL system is played back or "PAL60" when an NTSC tape is playbed back. No display appears when a tape recorded in the MESECAM system is played back.

43. Zooming Range Indicator
Shows the rough zooming range for a few seconds when the zoom switch is pressed.

44. Zoom Indicator
- "ZOOM" appears when the digital zoom is engaged.
- "I.ZOOM" appears in the instant zoom mode.

45. Digital Effect Mode Indicator
Appears when the DIGITAL EFFECT button is pressed.
- "16X9" appears when the 16X9 mode is engaged.
- "NEGPOS" appears when the negative recording mode is selected.
- "ZM:2" appears when the X130 digital zoom mode is selected.
- "MIRROR" appears when the half-mirror recording mode is selected.
- "MOSAIC" appears when the mosaic recording mode is selected.

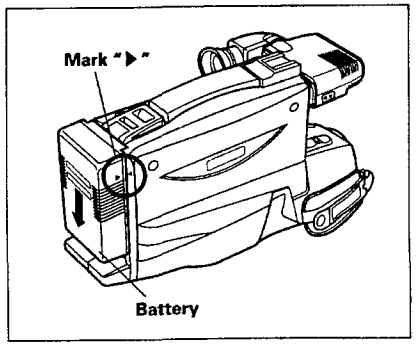
46. Fade Mode Indicator
Shows the selected fade mode when fading in and out.

47. Shutter Speed Indicator
Indicates the selected shutter speed.

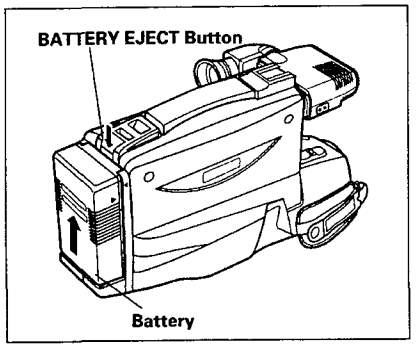
POWER SOURCES

■ WHEN USING WITH THE BATTERY

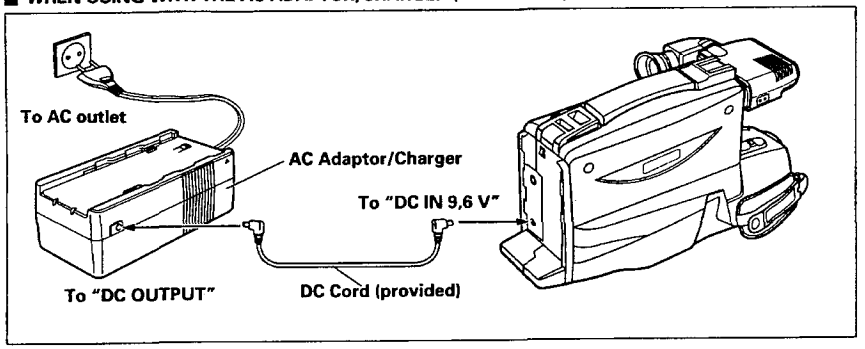
- To attach, align the mark "▶" on the battery with that of the camera/recorder so that the battery fits into the grooves, and slide the battery downward, as illustrated.



- To remove, slide the battery upward while pressing the BATTERY EJECT button in the direction of the arrow.



■ WHEN USING WITH THE AC ADAPTOR/CHARGER (VM-ACV23E)

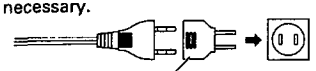


1. Connect one end of the DC cord (provided) to the "DC IN 9.6V" jack of the camera/recorder. Connect the other end of the DC cord to the "DC OUTPUT" of the AC adaptor/charger.
2. Plug the AC adaptor/charger power cord into an AC electrical outlet.
3. After the AC adaptor/charger has been used, unplug its power cord from the AC outlet.

See the bottom of the AC adaptor/charger. The rating label is located on the bottom of the AC adaptor/charger.

NOTES:

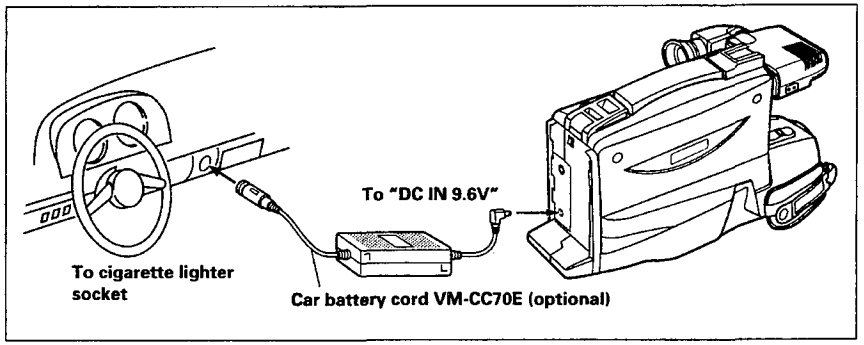
- The AC adaptor/charger cannot charge the battery and operate the camera/recorder at the same time.
- This AC adaptor/charger is universal for use with AC 110 — 240V around the world. If you use the camera/recorder in some foreign countries, an AC plug adaptor (provided) may be necessary.



AC Plug Adaptor (provided)

- When using the AC adaptor/charger to power the camera/recorder, the battery level indicator may display "▭" This indicator is used for battery operation and has no meaning when using the AC adaptor/charger to power the camera/recorder.

■ WHEN USING WITH THE CAR BATTERY (By using optional car battery cord Hitachi VM-CC70E)



1. Connect the small plug of the car battery cord to the "DC IN 9.6V" jack of the camera/recorder.
2. Connect the other end of the car battery cord to the car's cigarette lighter socket.

NOTES:

- The car battery cord is designed to be used only with automobiles having a 12-volt negative ground system.
- To avoid possible damage to your camera/recorder, make sure the car cord you plan to use has positive tip polarity and is capable of converting 12 volts to 9.6 volts such as Hitachi model VM-CC70E.

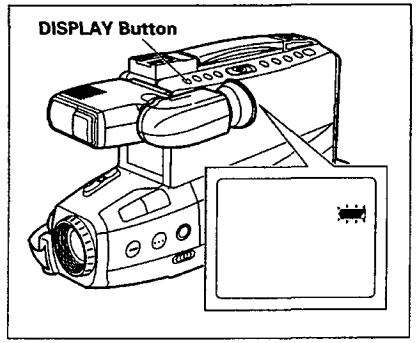
NOTE: Be sure to turn off power of the camera/recorder when attaching or detaching a power supply (battery, AC adaptor/charger, etc.) to the camera/recorder.

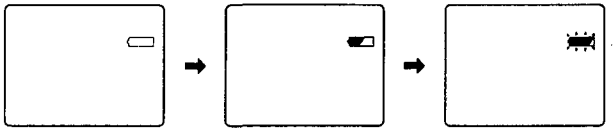
CHECKING THE BATTERY PACK

When the "▭" indication in the electronic viewfinder appears and flashes while the video camera/recorder is operated with a battery pack, it indicates that the battery charge is insufficient. Charge it or replace it with a charged battery pack.

Press the DISPLAY button, and the battery level indicator "▭" is displayed in the viewfinder indicating the condition of camera/recorder battery power. When the battery is fully charged, "▭" is displayed.
After several minutes, the symbol will change to "▭" When the battery is very near empty, the symbol will change to "▭" and start blinking. You should find an alternative power source or recharge the battery before continuing to use your camera/recorder.

NOTE: When a battery pack is used to power the camera/recorder, "▭" flashes even if the DISPLAY button is not pressed to warn you that the battery power level is low.

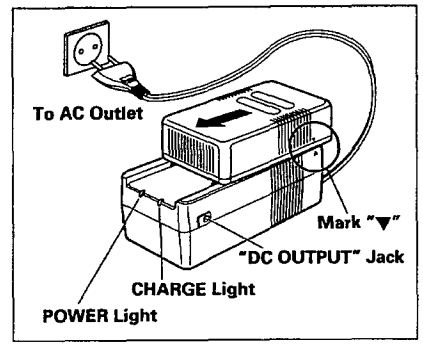




CHARGING THE BATTERY PACK

1. Plug the AC adaptor/charger power cord into AC electrical outlet.
2. Attach the battery to the AC adaptor/charger. Align the mark "▼" on the battery with that of AC adaptor/charger and push the battery flush with the AC adaptor/charger and slide it in the direction of arrow.
3. The POWER indicator will light and charging will start.

   NOTE: You must remove the DC cord from the AC adaptor/charger to charge the battery. If the DC cord is connected, the CHARGE light will not light.
4. The CHARGE light will be lit while the battery is accepting a charge, and will go out when the battery is fully charged.
5. After charging is finished, unplug its power cord from the AC outlet.



NOTES:

- The time required for charging the battery is approx. two hours for VM-BP66 and three hours for VM-BP67.
- When fully charged, the battery should supply approx. 90 — 120 minutes of operating time for VM-BP67 (45 — 60 minutes for VM-BP66) (depending on how much you use zoom and pause).
- Charge the battery after use and store it at normal room temperature.
- Recharge your battery at least once every six months. The battery is a lead-acid battery. This battery tends to discharge if not used for an extended period of time. If the battery is stored for a extended length of time without being recharged, you may not be able to recharge it.
- A battery charged after being stored for a long period may not supply power for the specified time. Additional rechargings will help restore the battery's operation time.
- The battery should be charged at a temperature of 10°C — 30°C to prevent damage.
- Do not operate the battery at temperatures below -10°C or above 35°C. The battery may be damaged if operated at temperatures above 50°C.
  Operation time will decrease at extremely low temperatures.
- After repeated chargings and use, the operation time will gradually decrease.
  When operation time becomes too short to be useful, it is time to replace the battery.
- If the CHARGE and POWER lights on the AC adaptor/charger start flashing, remove the battery and then reattach it. If after several attempts both lights continue to flash, this means your battery cannot take a charge and must be replaced with a new one.
  The CHARGE light will not light if a hot battery is attached to the AC adaptor/charger.
  Attaching an extremely hot battery to the AC adaptor/charger is not recommended; it should be allowed to cool down before being attached.
- Do not short the battery's terminal.
- Do not attempt to disassemble or modify the battery. There are no user serviceable parts inside.
- Throwing the battery into a fire or exposing the battery to excessive heat — over 65°C could be hazardous.

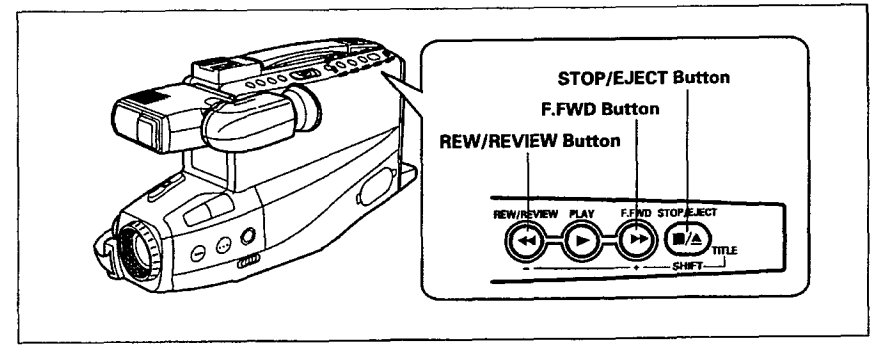
DATE/TIME SETTING

The date and time can be recorded on your tapes to act as a handy reference when viewing them at a later time.

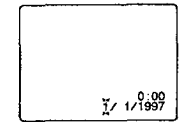
NOTE: A back-up battery for the date/time function is built into the camera/recorder. This battery is rechargeable and should be charged every two months. Charge the back-up battery by the following procedure.

1. Set the CAM/OFF/VIDEO switch to the "OFF" position.
2. Connect a power source (charged battery or AC adaptor/charger) to the camera/recorder and maintain this state for about 24 hours.

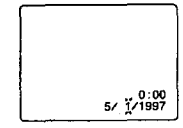
Use the following procedure to set up this display for the current date and time.



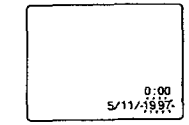
1. Press and hold the small button on the CAM/OFF/VIDEO switch, and then slide it to "CAM" position.
2. Press the DATE/TIME button.
   "0:00" and "1/1/1997" appears in the viewfinder and "1" flashes.



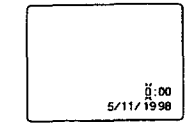
3. Press the F.FWD button to select correct date. Hold button down to advance rapidly. If you go past the date you want to set, press the REW/REVIEW button. When the correct date appears, press the STOP/EJECT button.



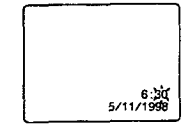
4. Press the F.FWD button to select correct month. Hold button down to advance rapidly. If you go past the month you want to set, press the REW/REVIEW button. When the correct month appears, press the STOP/EJECT button.



5. Press the F.FWD or REW/REVIEW button to select year, and then press STOP/EJECT button.



6. Press the F.FWD or REW/REVIEW button to select correct hour, and then press the STOP/EJECT button.
7. Press the F.FWD or REW/REVIEW button to select correct minute.



8. After setting correct minute, press the DATE/TIME button to start the internal clock.

   NOTE: After the date and time are set, "🕒 AUTO" appears and the camera/recorder enters the automatic date recording mode. See "DATE RECORDING" on page 16.

■ **To correct date/time after starting the date/time**

1. Press and hold the DATE/TIME button, and then press the STOP/EJECT button. The date starts flashing.
2. Correct the incorrect digit by using the F.FWD, REW/REVIEW and STOP/EJECT buttons.

■ **To correct date/time during programming**

1. Press the STOP/EJECT button repeatedly until the digit that is incorrect flashes.
2. Correct the incorrect digit by using the F.FWD, REW/REVIEW and STOP/EJECT buttons.

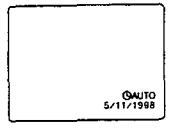
DATE RECORDING

When the date has been set, the camera/recorder will enter the automatic date recording mode automatically. Specify the required date mode option before recording.

1. Press and hold the small button on the CAM/OFF/VIDEO switch, and then slide it to "CAM" position.
2. Press the DATE/TIME button repeatedly to select the date display you want to record.

◷ AUTO and date — Automatic date recording

This option records the date automatically once a day at the beginning of recording for 10 seconds.

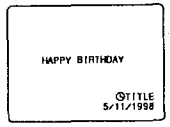


NOTES:

- The camcorder records the same date when;
  — the cassette is replaced.
  — you select ◷ AUTO and date display again.
  — the recording is less than 10 seconds long.
- If the date changes while recording continues over 10 seconds, the new date is recorded for about 10 seconds the next time you make a recording.

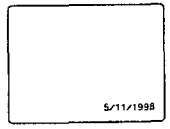
◷ TITLE and date — Automatic title and date recording

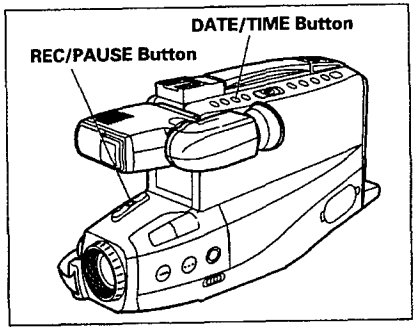
This option records the date and created title (see "TITLE RECORDING" on page 25) automatically once a day at the beginning of recording for 10 seconds.



Date only — Date recording

The camera/recorder records the date with the picture all the time.



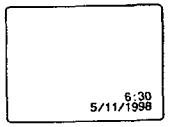


No display — No date recording

The camera/recorder does not record the date.

Date and time — Date and time recording

The camera/recorder records the date and time with the picture all the time.

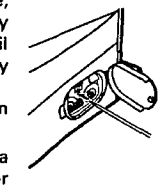


3. Press the REC/PAUSE button. Recording will start.

NOTES:

- When ◷ AUTO and date display is selected, the date disappears about 10 seconds after recording is started.
- When ◷ TITLE and date display is selected, the title and date disappear about 10 seconds after recording is started.

TROUBLESHOOTING

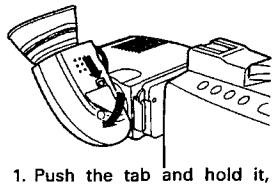
Symptom	Check Point & Correction
The cassette holder cannot be opened when you press the STOP/EJECT button in the stop mode.	Connect the power source.
Cassette cannot be inserted into cassette compartment.	Load cassette in direction indicated by arrow on cassette.
Picture does not appear in the viewfinder.	Remove the lens cap.
	Set the CAM/OFF/VIDEO switch to "CAM".
The camera/recorder can not go into the recording mode, even when the REC/PAUSE button is pressed.	The cassette has had the erase prevention tab removed. Stick a piece of cellophane tape over the erase prevention hole or select a different cassette.
	Set the CAM/OFF/VIDEO switch to "CAM"
	The "▬" indication in the electronic viewfinder flashes to indicate battery is discharged. Try another battery or charge the battery.
PLAY button cannot be engaged.	Set the CAM/OFF/VIDEO switch to "VIDEO"
Interference on playback picture.	Adjust the TRACKING control (power zoom switch T/W).
	When you see the playback picture on your TV, adjust fine tuning knob on television set to obtain the best picture.
	The prerecorded tape is LP recording. This camera/recorder is for use in SP recording only.
Picture is out of focus. Auto-focus does not operate.	Make sure that "FOCUS" dose not appear in the viewfinder. If "FOCUS" is displayed, press the FOCUS (AUTO/MAN) control buttons simultaneously so that it goes out.
Power is turned on, but no button operations are accepted.	Remove the power source, and after about one minute, push the reset switch gently using a toothpick, etc. until you feel a click. The display will be reset. Then set the information again. **NOTE:** When connecting a power source again, wait for about one minute after the reset switch is pressed. 

MAINTENANCE

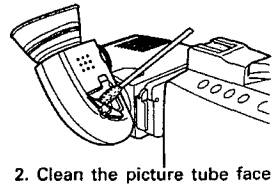
1. To maintain the optimum performance of this camera/recorder, regular periodic maintenance is required. Your dealer will advise you further.
2. Maintenance and adjustments may not be carried out by the user. In all cases of difficulty or doubt, consult your dealer.
3. Head cleaning
   - Dirt accumulated on the video heads after a period of time may cause the playback picture to become blurred or part of the video information to be lost. This does not mean that the recorded programme has been erased but head cleaning is required which must be carried out by your dealer.
   - Under no circumstances we do recommend users to attempt to clean the video heads as this is done only effectively by removal of the cover to gain access to the video heads and other parts which require cleaning, which would expose live conductors and present a "shock" hazard.
   - In regard to the various head cleaning tapes which are currently available on the market, these can cause damage and also reduce the operational life of the video heads if used incorrectly. Please consult your dealer as to the suitability of any cleaning aids before purchase.

■ CLEANING THE INSIDE OF THE ELECTRONIC VIEWFINDER

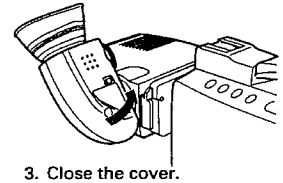
If dust or foreign matter adheres inside the viewfinder, clean it by using the following procedure.



1. Push the tab and hold it, then open the cover.



2. Clean the picture tube face and lens.
   To prevent scratching, use a soft non abrasive cloth, swab or lens cleaning paper.



3. Close the cover.

CHAPTER 2 DISASSEMBLY

Note: Reinstall the components by the reverse procedure to removal when not otherwise specified.

1. CASES AND CIRCUIT BOARDS

1.1 LENS HOOD, CASSETTE LID, LEFT CASE, ELECTRONIC VIEWFINDER (EVF) BLOCK

● LENS HOOD

1) Remove the lens cap.
2) Turn the lens hood in the direction of arrow (A).

● CASSETTE LID

1) Remove 2 screws (1) holding the cassette lid.

● LEFT CASE

1) Set the EVF to the position shown in Fig. 2-2.
2) Open the AV jack cover.
3) Remove 7 screws (2) holding the left case.
4) Remove 1 screw (3) holding the EVF holder.
5) Remove 2 screws (4) holding the right case.
6) Remove the left case from the right case.

● ELECTRONIC VIEWFINDER (EVF) BLOCK

7) Disconnect 2 connectors (5) on the SWS circuit board.
8) Remove 3 screws (6) holding the EVF holder.
9) Remove the EVF block from the right case.

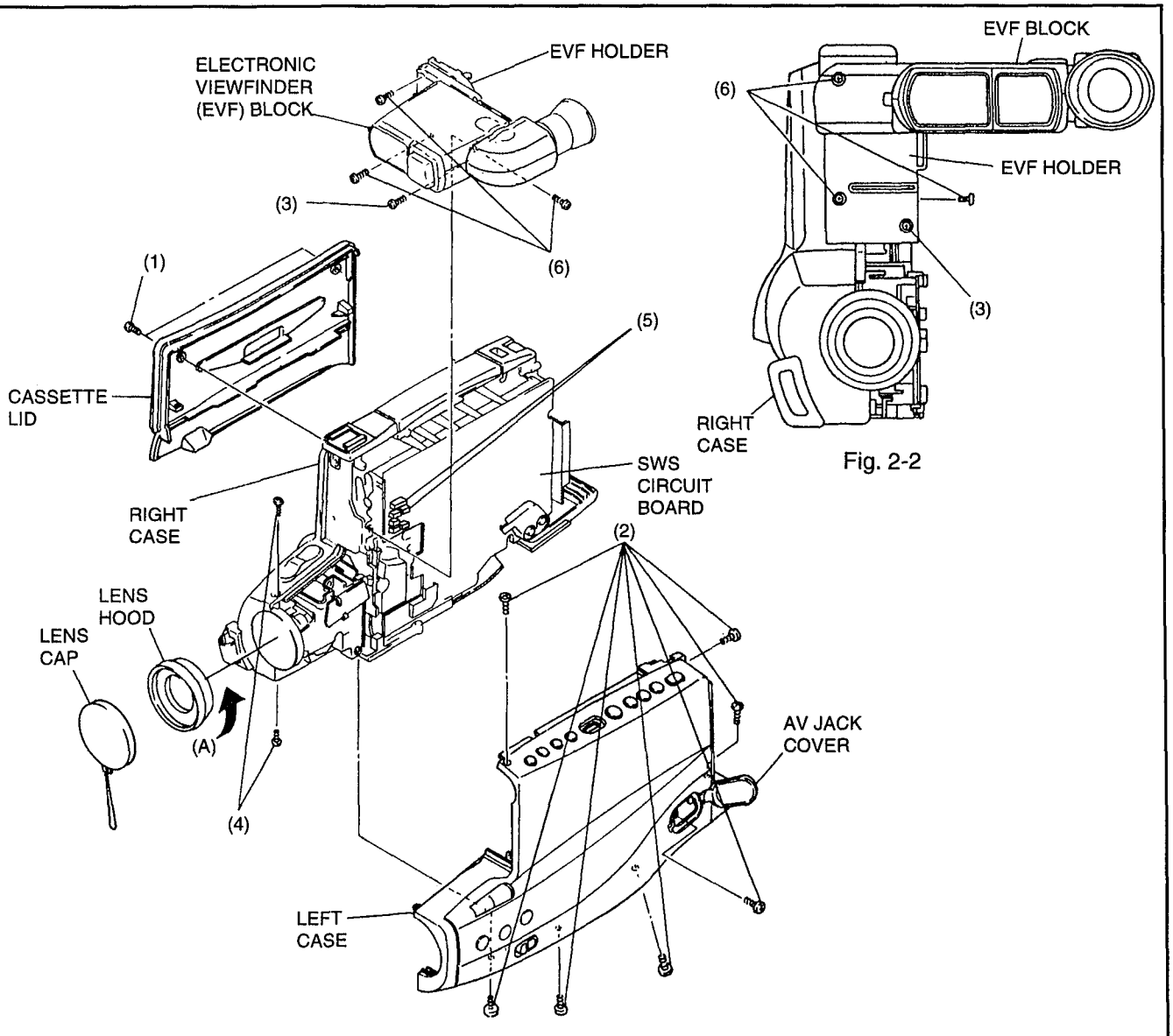


Fig. 2-1

Fig. 2-2

1.2 AV JACK COVER, POWER SWITCH KNOB

■ COMPONENTS TO REMOVE IN ADVANCE

· Left Case (Item No.: 1.1)

● AV JACK COVER

1) Turn the AV jack cover in the direction of arrow (A) and pull it out.

● POWER SWITCH KNOB

1) Release 2 tabs (1) and remove the power switch knob.

Note: When the power switch knob is removed, the spring between the power switch slider and knob holder comes off.

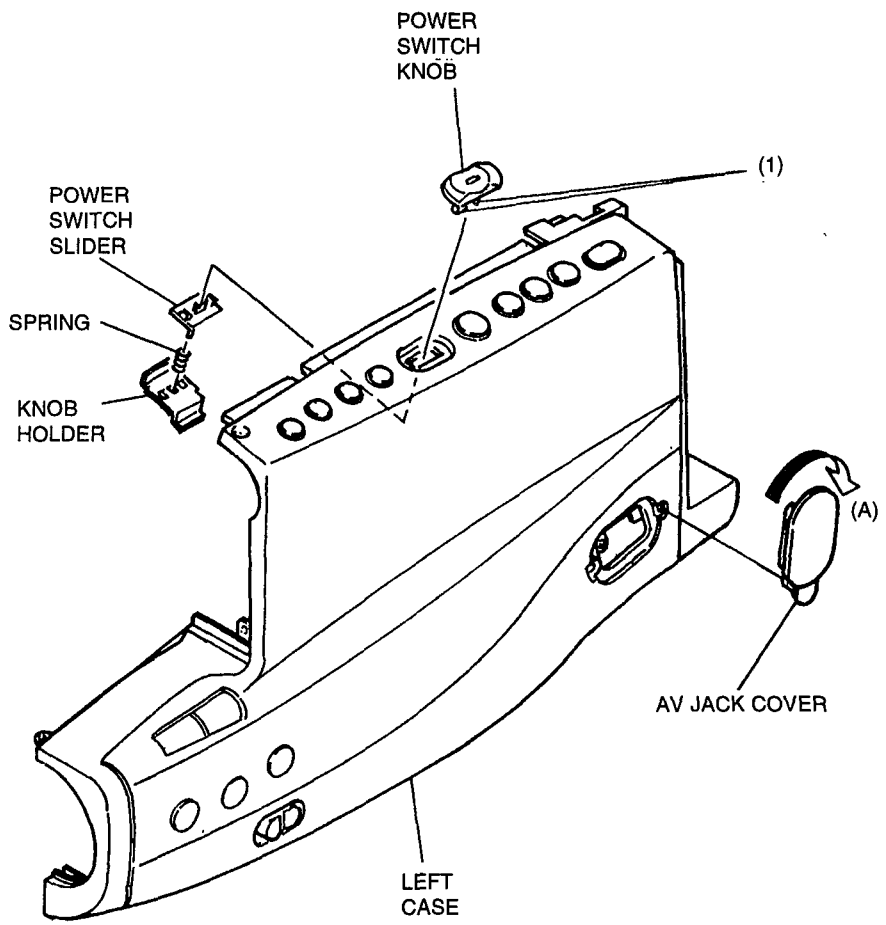


Fig. 2-3

1.3 CAMERA BLOCK, TRIPOD MOUNT, VCR BLOCK, RIGHT CASE

■ COMPONENTS TO REMOVE IN ADVANCE

· Cassette lid, Left Case, EVF Block (Item No.: 1.1)

Note: It is necessary to remove the cassette lid and EVF block when removing only the VCR block.

● CAMERA BLOCK

1) Disconnect 1 flat cable (1) on the SWS circuit board.
2) Remove 3 screws (2) holding the camera block.
3) Pull out the camera block from the right case.
4) Disconnect 1 connector (3) on the SPC circuit board.

● TRIPOD MOUNT

5) Release 1 tab (4) and slide the tripod mount in the direction of arrow (A) and pull it out.

● VCR BLOCK AND RIGHT CASE (Continued from the tripod mount removal)

6) Remove 1 screw (5) holding the VCR block and right case.
7) Remove 2 screws (6) holding the VCR block and right case.
8) Remove the VCR block from the right case.
9) Remove 1 screw (7) holding the shoulder pad.

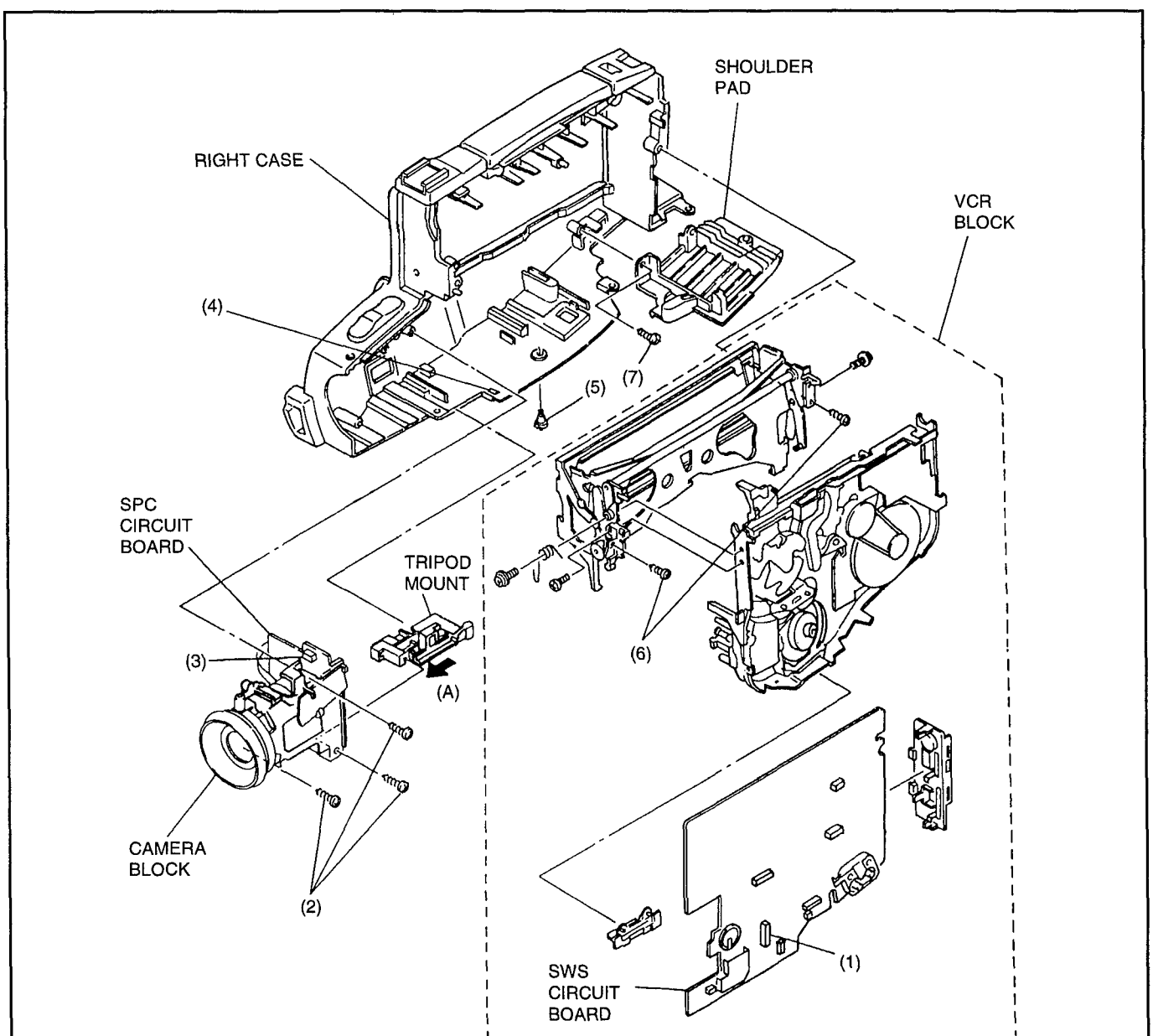


Fig. 2-4

1.4 HANDLE, ZOOM SWITCH, HAND STRAP

■ COMPONENTS TO REMOVE IN ADVANCE

- Left Case (Item No.: 1.1)
- Camera Block (Item No.: 1.3)
  [When the zoom switch and hand strap are remove.]
- VCR Block (Item No.: 1.3)
  [When the handle is remove.]

● HANDLE

1) Insert tweezers into hole (A) in the shoe spring to release the tab.
2) Pull out the shoe spring in the direction of arrow (B).
3) Remove 2 screws (1).
4) Move the accessory shoe in the direction of arrow (C) to pull it out.
5) Remove 2 screws (2) holding the handle holder-F.
6) Remove the handle holder-F in the direction of arrow (D).
7) Release the pins from holes (E) in the lever lock holder and then pull out the battery eject button.
8) Remove the lever lock.
9) Remove 1 screw (3) holding the handle holder-R.
10) Remove the handle holder-R in the direction of arrow (F).

● ZOOM SWITCH

1) Release 4 tabs (4) of the zoom switch.

● HAND STRAP

1) Remove 2 screws (5) holding the hand strap.
2) Remove the hand strap from the right case.

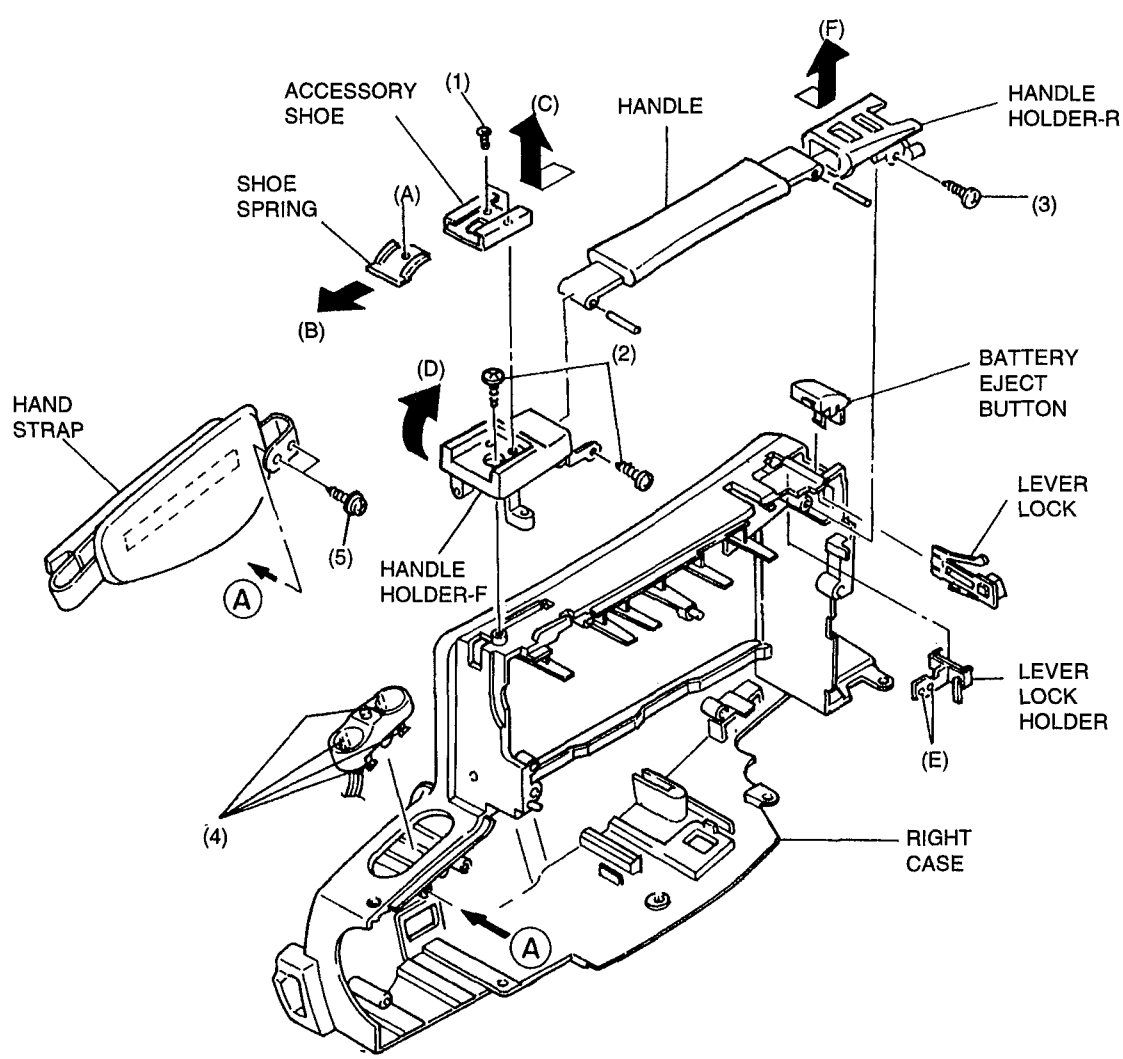


Fig. 2-5

1.5 SWS CIRCUIT BOARD, TAPE TRANSPORT MECHANISM

■ COMPONENTS TO REMOVE IN ADVANCE

- Cassette Lid, Left Case, EVF Block (Item No.: 1.1)
- Camera Block, Tripod Mount, VCR Block, Right Case (Item No.: 1.3)

● SWS CIRCUIT BOARD

1) Remove 1 screw (1) holding the GND cable.
2) Disconnect 4 connectors (2) on the SWS circuit board.
3) Disconnect 4 connectors (3) on the SWS circuit board.
4) Disconnect 1 connector (4) on the SWS circuit board.
5) Disconnect 2 flat cables (5) on the SWS circuit board.
6) Release 2 tabs (6) and open the SWS circuit board in the direction of the arrow.
7) Release 2 tabs (7) of the SWS circuit board holder

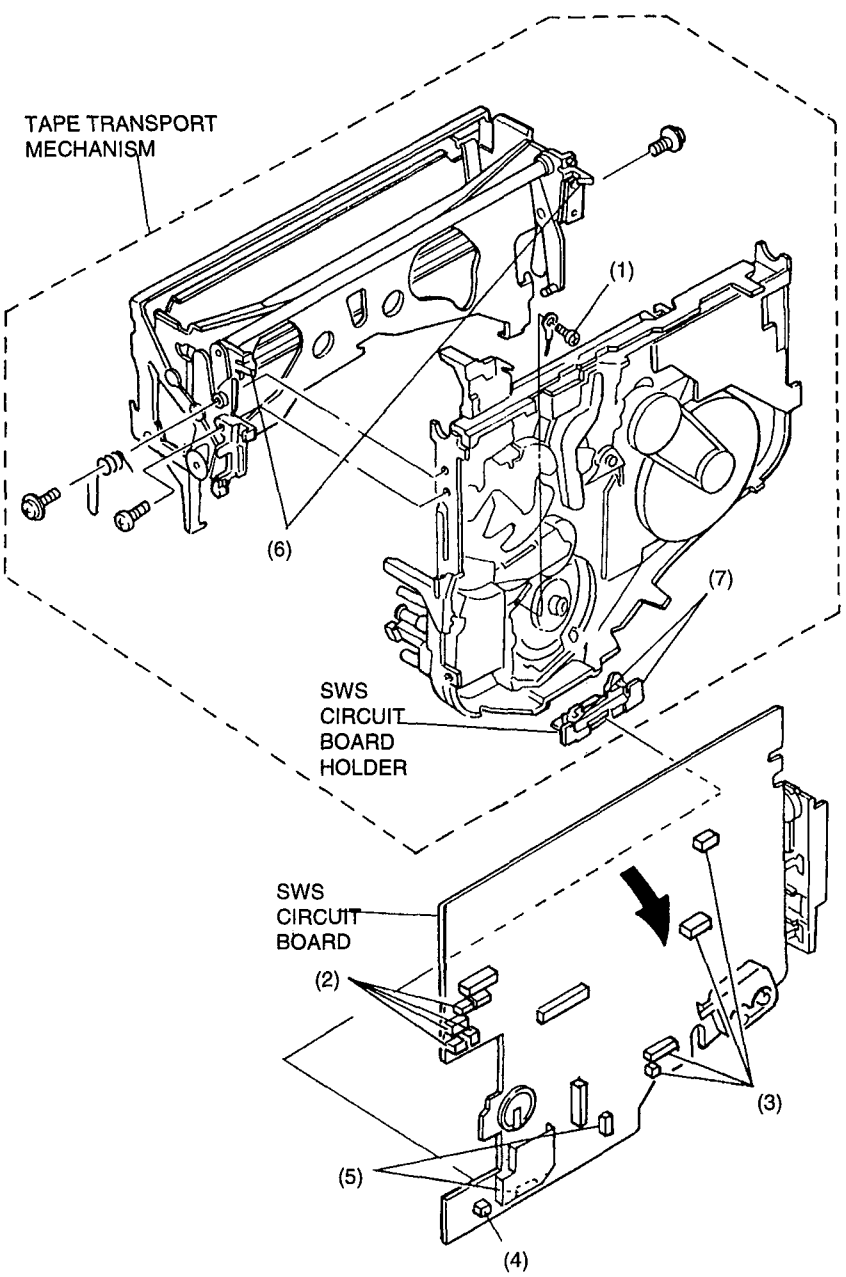


Fig. 2-6

1.6 CON CIRCUIT BOARD, HOOD HOLDER, LENS BLOCK, CCD IMAGE SENSOR, SPC CIRCUIT BOARD

■ COMPONENTS TO REMOVE IN ADVANCE

- Lens Hood, Left Case (Item No.: 1.1)
- Camera Block (Item No.: 1.3)

● CON CIRCUIT BOARD

1) Disconnect 1 connector (1) on the CON circuit board.
2) Release 2 tabs (2) and remove the CON circuit board.

● HOOD HOLDER, LENS BLOCK

Note : Remove the CON circuit board in advance from a model no which it is mounted.

1) Release 2 tabs (3) and remove the hood holder.

Note : When the hood holder is removed, the rubber ring comes off. See the upper left in Fig. 2-7 for reinstalling the rubber ring.

2) Disconnect 1 flat cable (4) on the SPC circuit board.
3) Remove 3 screws (5) holding the camera frame.
4) Remove 2 screws (6) holding the lens block.

Note: When the lens block is removed, the crystal filter and sensor rubber come off. Be careful not to damage the crystal filter.

● CCD IMAGE SENSOR AND SPC CIRCUIT BOARD

5) Unsolder 14 points (7) (terminal of CCD image sensor) on the SPC circuit board.
6) Remove 2 screws (8) holding the SPC circuit board.

Note: Be careful not to damage the CCD image sensor. Be sure not to remove the CCD image sensor from the sensor plate.

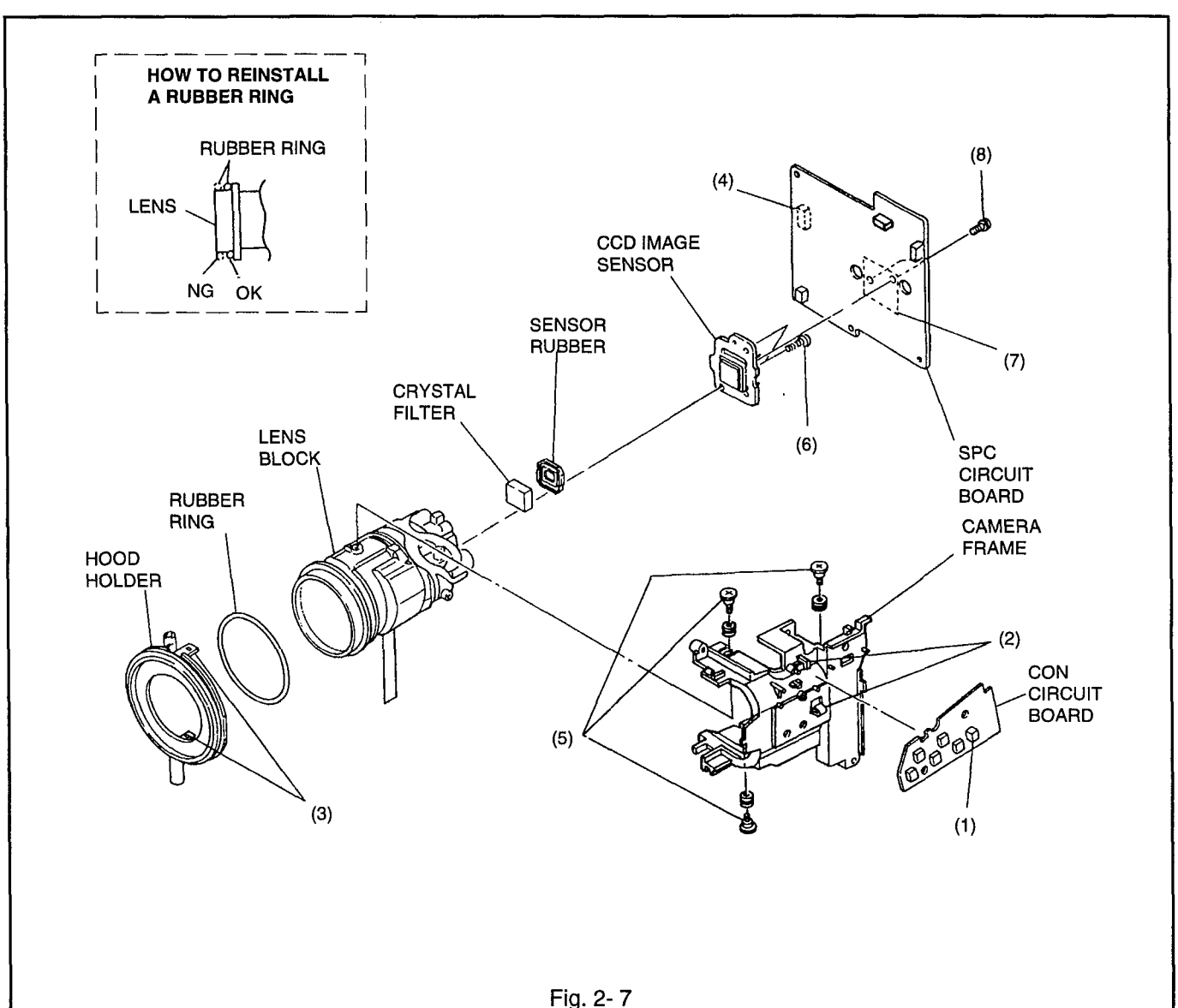


Fig. 2- 7

2. ELECTRONIC VIEWFINDER (EVF) BLOCK

2.1 EVF HOLDER, CABLE GUIDE, CABLE HOLDER

■ COMPONENTS TO REMOVE IN ADVANCE

· EVF Block (Item No.: 1.1)

● EVF HOLDER, CABLE GUIDE, CABLE HOLDER

1) Set the EVF to the position shown in Fig. 2-8.
2) Remove 1 screw (1) holding the cable guide.
3) Insert a thin screwdriver into hole (A) in the EVF holder and then remove the EVF holder in the direction of arrow (B).
4) Release 2 tabs (2) of the cable holder.

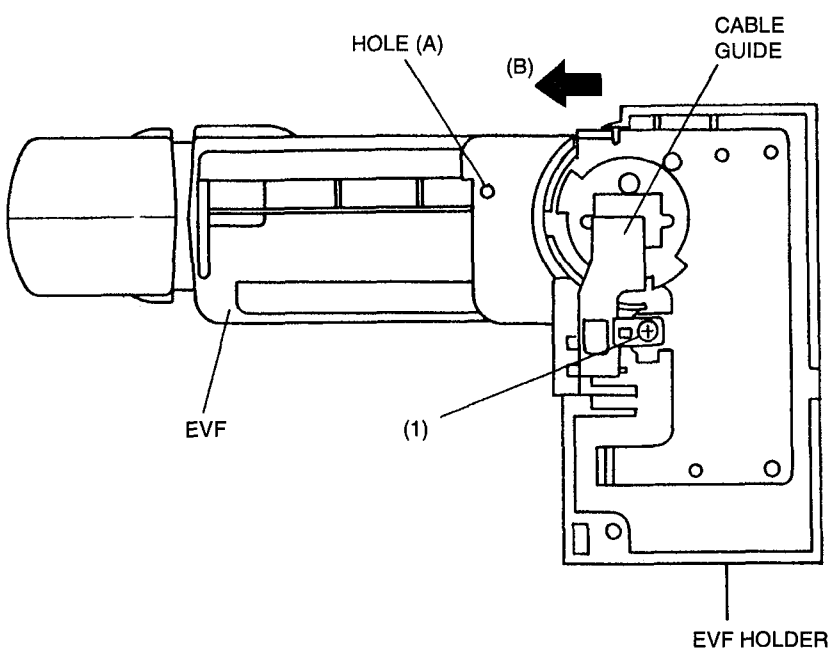


Fig. 2-8

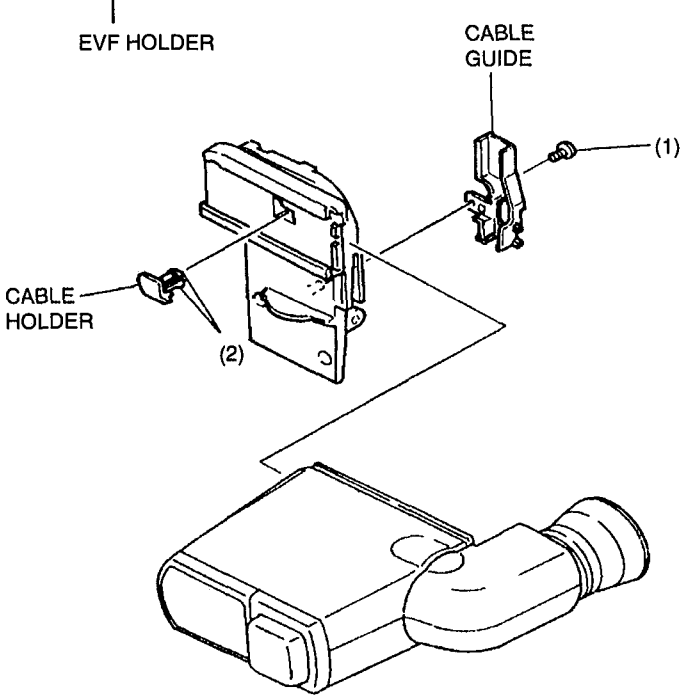


Fig. 2-9

2.2 LIGHT COVER, EVF TOP CASE, EVF NECK BLOCK, MICROPHONE (MIC) UNIT, LIGHT TERMINAL, EVF CIRCUIT BOARD, EVF BOTTOM CASE

■ COMPONENTS TO REMOVE IN ADVANCE

· EVF Block (Item No.: 1.1)

● LIGHT COVER, EVF TOP CASE

1) Release 1 tab (1) and remove the light cover.
2) Remove 4 screws (2) holding the EVF top and bottom cases.
3) Remove the EVF top case from the bottom case.

● EVF NECK BLOCK

4) Disconnect 1 connector (3) on the EVF circuit board and CRT socket.
5) Remove the EVF neck block from the EVF bottom case.

● MICROPHONE (MIC) UNIT

4) Disconnect 1 connector (4) on the MIC.
5) Remove the MIC from the EVF bottom case.

● LIGHT TREMINAL

4) Disconnect 1 connector (5) on the EVF circuit board.
5) Pull out the cable holder from the EVF bottom case.
6) Pull out the light holder from the EVF bottom case.
7) Remove 1 screw (6) holding the light terminal.

● ELECTRONIC VIEWFINDER (EVF) CIRCUIT BOARD, EVF BOTTOM CASE

8) Remove the EVF circuit board from the EVF bottom case.

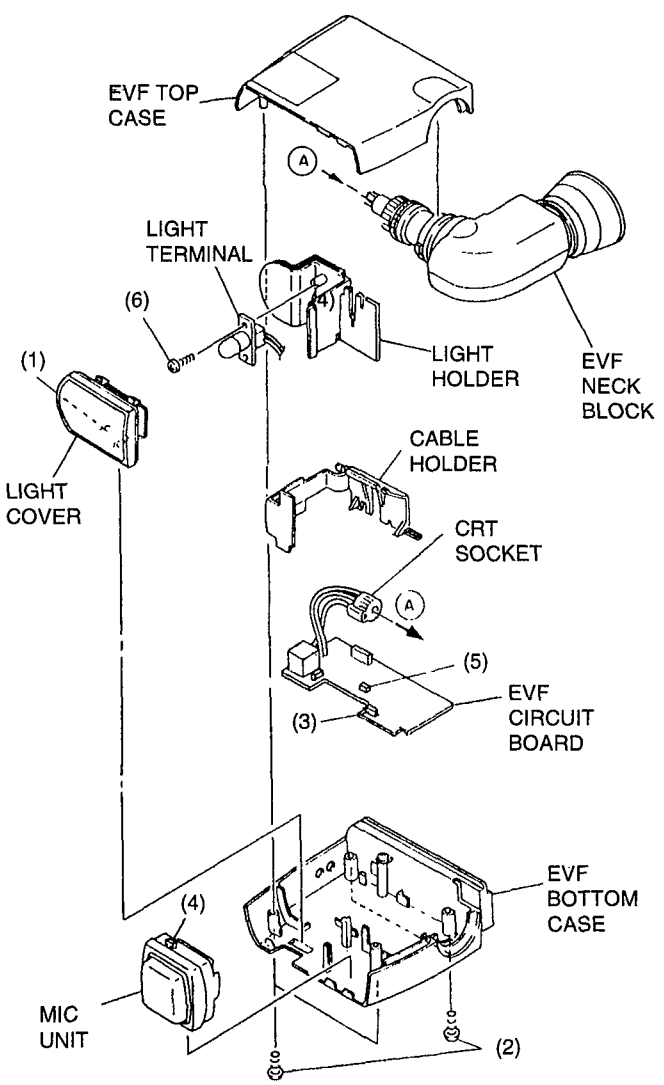


Fig. 2-10

2.3 EYE CUP, NECK TOP CASE, NECK BOTTOM CASE, MIRRER, EVF LENS, CRT FRAME, CRT

■ COMPONENTS TO REMOVE IN ADVANCE

- EVF Block (Item No.: 1.1)
- Light Cover, EVF Top Case, Neck Block (Item No.: 2.2)

● EYE CUP

1) Turn the eye cup in the direction of arrow (A).
2) Remove the eye cup in the direction of arrow (B).

● NECK TOP CASE, NECK BOTTOM CASE

3) Remove 1 screw (1) holding the neck bottom case and neck top case.
4) Remove the neck top case from the neck bottom case.
5) Remove the mirror from the neck bottom case.
6) Remove the EVF lens from the neck bottom case.
7) Remove the CRT unit from the neck bottom case.

● CRT FRAME, CRT

8) Remove 1 screw (2) holding the CRT frame and CRT.
9) Remove the CRT frame the CRT.

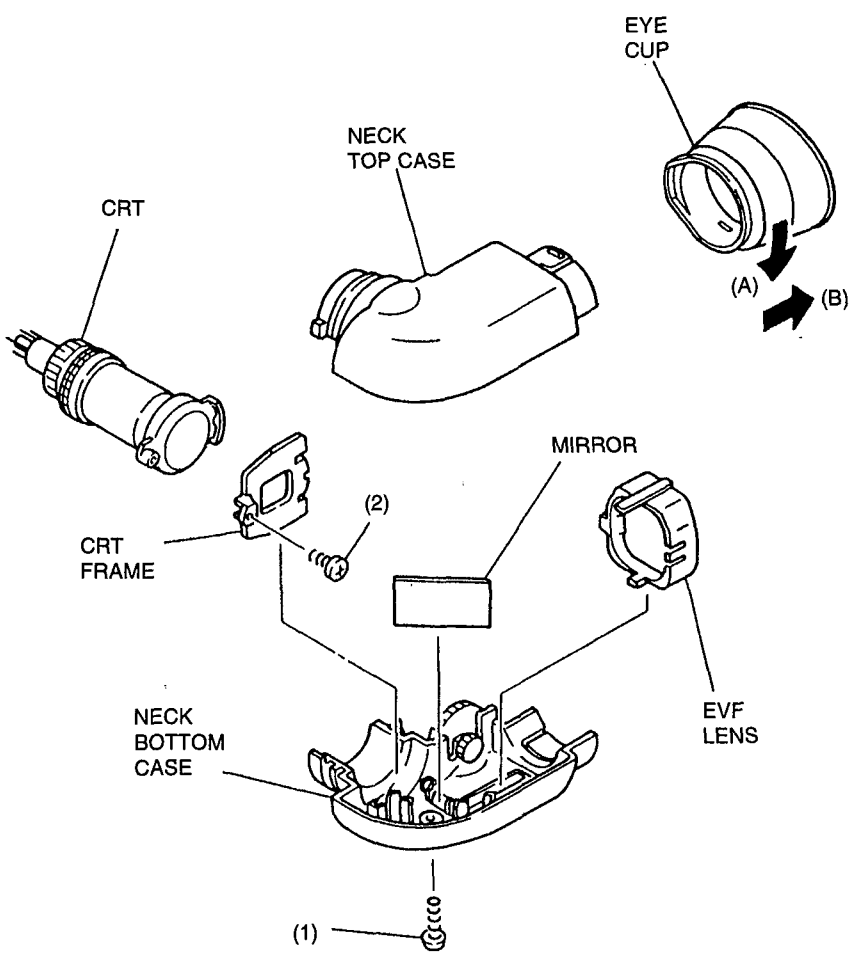


Fig. 2-11

CHAPTER 3 ELECTRICAL ADJUSTMENT

1. CAMERA SECTION ADJUSTMANTS

1.1 CIRCUIT BOARD LOCATION

1. SPC (Sensor/Process) Circuit Board
2. TSS (Supply Sensor) Circuit Board
3. ERS (Take-up Sensor) Circuit Board
4. SWS (Main) Circuit Board
5. CON (Control) Circuit Board

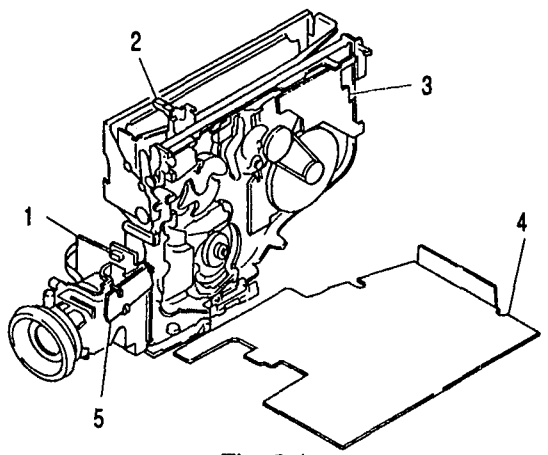


Fig. 3-1

1.2 TEST EQUIPMENT NECESSARY FOR ADJUSTMENT

Test Equipment

Oscilloscope (dual trace)
〔Vectorscope〕
Digital Voltmeter (DVM)
Color Video Monitor

Jigs, etc.

Adjustment Floppy Disk
Personal Computer
Personal Computer 9-pin or 25-pin (RS232C) Cable
DSP-R Jig
3P Extension Cable
6P Extension Cable
Light Box (3100° K)
Light Balancing Filter C12
DC Power Supply (DC9.6V/3A)
DC Power Supply (DC5V/1A)

1.3 ADJUSTMENT CONDITION

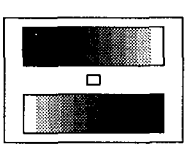
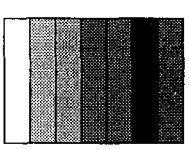
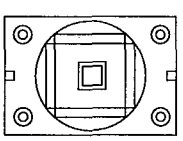
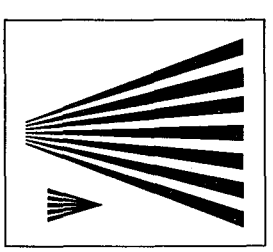
1) Check that the VCR section has been adjusted correctly before adjusting the camera section.
2) Use a light box with minimum flickering. Control the color temperature of the light box strictly.
3) Connect this unit, a power supply and a color video monitor as shown in Fig. 3-2.
4) When using the video out (AV OUT) to perform adjustment, be sure to terminate the AV OUT jack with 75 ohms.
5) Place the chart (light box) approx. 30cm away from the camera (lens surface) when otherwise not specified.
6) Point the camera at the chart to full the video period when otherwise not specified.
7) Use the 10:1 probe of the oscilloscope when otherwise not specified.
8) When "Trigger the oscilloscope internally" is specified, set the time base of the oscilloscope to 10μs/div.

1.4 PRESET POSITIONS OF SWITCHES AND CONTROLS DURING ADJUSTMENT

CAM/OFF/VIDEO switch ····· "CAM" position
DISPLAY ····· Not Display mode
DATE/TIME ····· Not Display mode
TITLE ····· Not Display mode
LIGHT switch ····· "OFF" position
INST. ZOOM ····· Not Display mode
DIGITAL FADE ····· OFF (Normal) mode
DIGITAL EFFECT ····· OFF (Normal) mode
AV IN/OUT ····· "OUT" position

1.5 LIST OF CHARTS FOR CAMERA ADJUSTMENT

Table 3-1

GRAY SCALE CHART (11 steps)	COLOR BAR CHART	RESOLUTION CHART
		
BACKFOCUS ADJUSTMENT CHART		

1.6 CONNECTION FOR ADJUSTMENT

Remove the component, etc. listed below first, referring to "CHAPTER 2 DISASSEMBLY". (See Fig. 3-2)

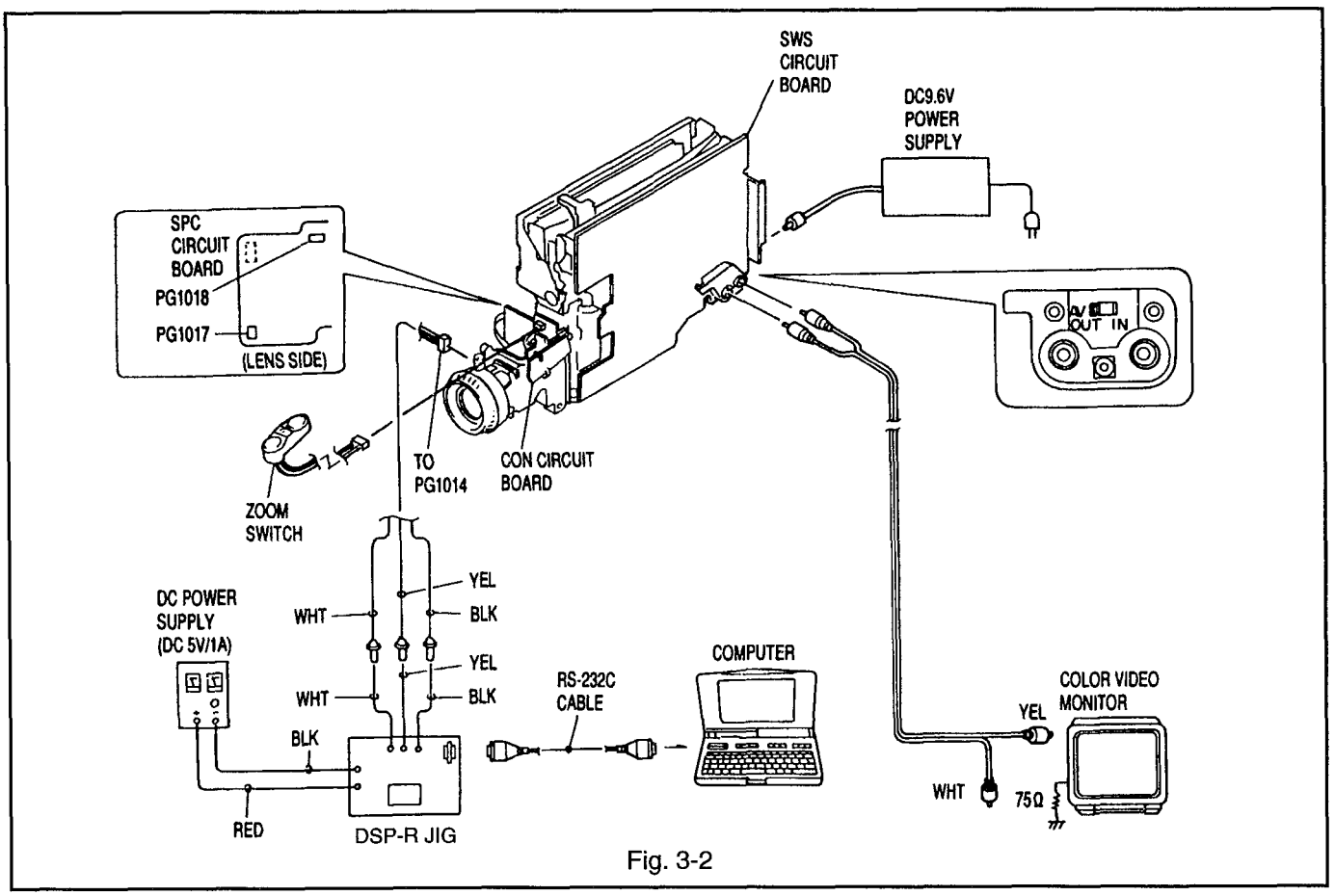


Fig. 3-2

1.7 ADJUSTMENTS AFTER REPLACING MAJOR COMPONENTS IN THE CAMERA SECTION

After replacing major components, perform adjustments, referring to the table below.
The following table shows the minimum adjustments required after major components are replaced.
The table below may not apply when several components are replaced, depending on the symptom of the defect.

Table 3-2

ITEM No.	NAME OF ADJUSTMENT	NAME OF MAJOR COMPONENTS									
		SPC Board	IC1107 (EEP-ROM)	IC1001	IC1101	IC1103	IC1106	IC1201			
INITIAL SETTING BY MODEL		●	●				●				
ELECTRIC VOLUME ADJUSTMENT PROCEDURE											
(1)	CDS Offset Adjustment	●	●		●		●				
(2)	CDS Smpling Pulse Adjustment	●	●			●	●				
DIGITAL ADJUSTMENT PROCEDURE											
(1)	Auto Iris Control Adjustment	●	●	●	●		●	●			
(2)	Knee Adjustment	●	●		●		●				
(3)	Matrix Adjustment	●	●	●	●		●				
(4)	White Balance Adjustment	●	●	●	●		●				
(5)	Chroma Gain Adjustment	●	●	●	●		●				
AUTOFOCUS ADJUSTMENT PROCEDURE											
(1)	Zoom Trace Adjustment	●	●				●				
(2)	AF Noise Level Adjustment	●	●				●				
SPOT NOISE ADJUSTMENT PROCEDURE		●	●				●				

1.8 ADJUSTMENT PROCEDURE

Note: 1. The digital adjustment program for camera is called the MAP (Manual Adjustment Program).
2. To complete adjustment, press the [ESC] (escape) key twice to restore the MS-DOS screen and then turn off the camera recorder and jigs.

1.8.1 How to Start the Adjustment Programe (MAP)

Note: The following describes an example of the instructions of the personal computer and the menu display; they are different depending on the personal computer manufacturer and model.
Refer to the instruction manual of personal computer.

1) Turn the personal computer on and start the MS-DOS system. (Fig. 3-3)
(Refer to the instruction manual of the personal computer for how to start the computer.)

2) Load the adjustment floppy disk into disk drive A and press **A:** then [ENTER]. (A may be small letter.)
(Fig. 3-4)
(If the adjustment floppy disk is loaded into disk drive B, press **B:** then [ENTER]).

3) Press **MAP_IBM** (SPACE) **1** then [ENTER] (MAP and IBM may be small letters).
The digital adjustment program (MAP: Manual Adjustment Program) starts and the MODEL SELECT shown Fig. 3-7 appears.
(When you use a personal computer with two serial interface connectors and connect the DSP-R jig to serial interface connector 2, press MAP_IBM 2.)

4) Select the number accodding to the model.
If [ESC] (escape) is pressed, the display before the MAP starts (MS-DOS) is restored.

Note: 1. If you specify the wrong model, press [ESC] (escape) to restore the MODEL SELECT display, then specify the correct model.
2. If you select number without a model name by mistake, the message shown in Fig. 3-10 will appear in the computer's display.
Press any key to return the display to Fig. 3-7 (MODEL SELECT).
3. If there are more than 5 models and **P** key is pressed, the computer's display changes to the next page.

```
C>
```

Fig. 3-3

Load the camera adj. floppy disk into disk drive A.

Press **A:** [ENTER].

```
C>A:
A>
```

Fig. 3-4

Press **MAP_IBM** (SPACE) **1** [ENTER].

```
C>A:
A>MAP_IBM 1
```

Fig. 3-5

```
MANUAL ADJUSTMENT PROGRAM FOR SERVICE STATION
COPYRIGHT (C) HITACHI LTD
```

Fig. 3-6

MODEL SELECT MENU

```
**************************************************
                  MODEL SELECT
**************************************************
            [1]   xxxxxx
            [2]   xxxxxx
            [3]   xxxxxx
            [4]   xxxxxx
            [5]   xxxxxx
            [P]   NEXT SELECTION
            [ESC] END
      PLEASE SELECT THE TYPE OF THE SET.
      PRESS [1] - [5] OR [P] OR [ESC]
```

Fig. 3-7

Press numeric key.

5) Press **Y** to display MANUAL ADJUSTMENT MENU. (See Fig. 3-8, 3-9)

- Refer to "1.8.2 Initial Setting by Model" for DATA INITIALIZE.
- Refer to "1.8.3 Electric Volume Adjustment Procedure" for ELECTRIC VOLUME.
- Refer to "1.8.4 Digital Adjustment Procedure" for ADJUSTMENT.
- Refer to "1.8.5 Autofocus Adjustment Procedure" for AUTO FOCUS.
- Refer to "1.8.6 Spot Noise Adjustment Procedure" for SPOT NOISE.

```
Selected model is xxxxxxx
Are you sure? (Y/N)
```

Fig. 3-8

Press **Y** key.

MAIN MENU

```
**********************************************
        MANUAL ADJUSTMENT PROGRAM
**********************************************
          [A]   DATA INITIALIZE
          [B]   ELECTRIC VOLUME
          [C]   ADJUSTMENT
          [D]   AUTO FOCUS
          [E]   SPOT NOISE
          [ESC] END
      PRESS SELECT [A] - [E] OR [ESC]
```

Fig. 3-9

MESSAGE WHEN OPERATED BY MISTAKE

```
CAN NOT FIND THE DATA FILE
**** PRESS ANY KEY ****
```

Fig. 3-10

1.8.2 Initial Setting by Model

Note: This item describes how to initialize the EEP ROM. Be sure to perform this item after replacing EEP ROM or SPC circuit board.
When other components are replaced, normally, it is not necessary to initialize the EEP ROM.
Press [ESC] (escape) to return the computer's display to MAIN MENU.

1) Start the MAP, referring to "1.8.1 How to Start the Adjustment Program (MAP)".

2) Press **A** to select DATA INITIALIZE. (Figs. 3-11, 3-12)

3) Press **Y** to start. (Figs. 3-12, 3-13)
(Press **N** to return to MAIN MENU)

4) If there are no abnormalities in the camera/recorder, the message shown in Fig. 3-13 is displayed in the computer's display for a while, and then the message informing you that the initial setting has been compieted (shown in Fig. 3-14) is displayed.

MAIN MENU

```
**********************************************
        MANUAL ADJUSTMENT PROGRAM
**********************************************
          [A]   DATA INITIALIZE
          [B]   ELECTRIC VOLUME
          [C]   ADJUSTMENT
          [D]   AUTO FOCUS
          [E]   SPOT NOISE
          [ESC] END
      PRESS SELECT [A] - [E] OR [ESC]
```

Fig. 3-11

Press **A** key.

```
<< DATA WRITING >>
START TO SEND DATA.  (Y/N)
```

Fig. 3-12

Press **Y** key.

```
<< DATA WRITING >>
PLEASE WAIT A MOMENT
```

Fig. 3-13

5) If the message shown in Fig. 3-14 appears in the computer's display, press any key. The computer's display returns to Fig. 3-11 (MAIN MENU).

6) Be sure to perform the following adjustments after completing the initial setting.
   - 1.8.3 Electric Volume Adjustment Procedure
   - 1.8.4 Digital Adjustment Procedure
   - 1.8.5 Autofocus Adjustment Procedure
   - 1.8.6 Spot Noise Adjustment Procedure

Note: If an error message appears in the computer's display, refer to "Error Messages" . If a key is pressed after the error message appears, the computer's display returns to the MAIN MENU (Fig. 3-11)

```
<< DATA WRITING >>
PLEASE WAIT A MOMENT
FINISHED WRITING DATA
PRESS ANY KEY
```

Fig. 3-14

Press any key to return to Fig. 3-11.

1.8.3 Electric Volume Adjustment Procedure

Note: When EEP ROM or SPC circuit board is replaced, initialize the EEP ROM, referring to "1.8.2 Initial Setting By Model" then perform all the electric volume adjustments.

1) Start the MAP, referring to "1.8.1 How to Start the Adjustment Program (MAP)".

2) Press **B** to select ELETRIC VOLUME. (Figs. 3-15, 3-16)

3) Select the number of the required adjustment.
(If [ESC] (escape) is pressed, the computer's display returns to MAIN MENU).

Note: 1. To complete adjustment, press the [ESC] (escape) key twice to restore the MS-DOS screen and then turn off the camera/recorder and jig.
2. When an error message appears during adjustment, refer to "Error Messages".

MAIN MENU

```
**********************************************
        MANUAL ADJUSTMENT PROGRAM
**********************************************
        [A]   DATA INITIALIZE
        [B]   ELECTRIC VOLUME
        [C]   ADJUSTMENT
        [D]   AUTO FOCUS
        [E]   SPOT NOISE
        [ESC] END
     PRESS SELECT [A] - [F] OR [ESC]
```

Fig. 3-15

Press **B** key.

ELECTRIC VOLUME ADJ. MENU

```
**********************************************
        ELECTRIC VOLUME
**********************************************
        [1]   CDS OFFSET
        [2]   CDS SAMPLING PULSE
        [ESC] RETURN TO MAIN MENU

     PLEASE SELECT [1], [2] OR [ESC]
```

Fig. 3-16

(1) CDS Offset Adjustment

Purpose:	To determine the DC offset levels when the AGC is set to the minimum and maximum gains.
Incompleted phenomenon:	When a subject is illuminated brightly in low lighting , a white band appears across the top of the screen.

Procedure:

ELECTRIC VOLUME ADJ. MENU

```
**********************************************
            ELECTRIC VOLUME
**********************************************
        [1]    CDS OFFSET
                :
```

Press **1** key to select the CDS OFFSET.

```
<< ADJUSTMENT OF CDS OFSET >>
PLEASE WAIT AROUND 50 SEC.
```

```
<< ADJUSTMENT OF CDS OFFSET >>
FINISHED WRITING DATA.
ADJUSTMENT COMPLETED.
PRESS ANY KEY.
```

Press any key to return to ELECTRIC VOLUME MENU.
Turn the power off for 5 seconds and then on again.

(2) CDS Sampling Pulse Adjustment

Purpose:	To synchronize the horizontal sync siganl with the subcarrier frequency.
Incompleted phenomenon:	The picture is distorted.

Procedure:

ELECTRIC VOLUME ADJ. MENU

```
**********************************************
            ELECTRIC VOLUME
**********************************************
                :
        [2]    CDS SAMPLING PULSE
                :
```

Press **2** key to select the CDS SAMPLING PULSE.

```
<< ADJUSTMENT OF CDS SAMPLING PULSE >>
<< NOW ADJUSTING >>
```

```
<< ADJUSTMENT OF CDS SAMPLING PULSE >>
FINISHED WRITING DATA.
ADJUSTMENT COMPLETED.
PRESS ANY KEY.
```

Press any key to return to ELECTRIC VOLUME MENU.

1.8.4 Digital Adjustment Procedure

Note: 1. When EEP ROM or SPC circuit board is replaced, initialize the EEP ROM, referring to "1.8.2 Initial Setting By Model" then perform all the digital adjustments.
2. When an error message appears during adjustment, refer to "Error Messages". If a key is pressed after an error message appears, the ADJUSTMENT MENU is restored.

1) Start the MAP, referring to "1.8.1 How to Start the Adjustment Programme (MAP)".

2) Press **C** to select ADJUSTMENT. (Figs. 3-17, 3-18)

3) Select the number of the required adjustment.
(If [ESC] (escape) is pressed, the computer's display returns to MAIN MENU).

Note: 1. To complete adjustment, press the [ESC] (escape) key twice to restore the MS-DOS screen and then turn off the camera/recorder and jig.
2. [1] AUTO IRIS CONTROL and [2] KNEE procedures must always be performed in sequence

MAIN MENU

```
**********************************************
        MANUAL ADJUSTMENT PROGRAM
**********************************************
        [A]    DATA INITIALIZE
        [B]    ELECTRIC VOLUME
        [C]    ADJUSTMENT
        [D]    AUTO FOCUS
        [E]    SPOT NOISE
        [ESC]  END
    PRESS SELECT [A] - [E] OR [ESC]
```

Fig. 3-17

Press **C** key.

ADJUSTMRNT MENU

```
**********************************************
        MANUAL ADJUSTMENT PROGRAM
**********************************************
        [1]    AUTO IRIS CONTROL
        [2]    KNEE
        [3]    MATRIX
        [4]    WHITE BALANCE
        [5]    CHROMA GAIN
        [ESC]  RETURN TO MAIN MENU
    PLEASE SELECT [1] - [5] OR [ESC]
```

Fig. 3-18

(1) Auto Iris Control Adjustment

Purpose:	To set the iris control data.
Incompleted phenomenon:	·The picture becomes too bright. ·The picture becomes too dark.
Condition:	Point the camera at the light box without a chart to full the screen (at wide angle).

Procedure:

ADJUSTMRNT MENU

```
************************************************
        MANUAL ADJUSTMENT PROGRAM
************************************************
        [1]    AUTO IRIS CONTROL
                    :
```

Press **1** key to select the AUTO IRIS CONTROL.

```
<< ADJUSTMENT OF IRIS OPEN & CLOSE >>
    PLEASE WAIT AROUND 10 SEC.
```

```
<< ADJUSTMENT OF IRIS OPEN & CLOSE >>
    PLEASE WAIT AROUND 10 SEC.
    DATA WRITEN INTO EEPROM
    ADJUSTMENT FINISHED
        PRESS ANY KEY
```

Press any key, and the display changes as follows.

```
        << ADJUSTMENT OF IRIS >>
    PLEASE WAIT AROUND 20 SEC.
```

§1

```
        << ADJUSTMENT OF IRIS >>
    PLEASE WAIT AROUND 20 SEC.
ROUGH ADJUSTMENT        : xx TIMES
FINE ADJUSTMENT         : xx TIMES
        ADJUSTMENT FINISHED
            PRESS ANY KEY
```

Press any key, and the display changes as follows.

```
    << ADJUSTMENT OF HALLCURVE >>
    PLEASE WAIT AROUND 30 SEC.
```

§2

```
    << ADJUSTMENT OF HALLCURVE >>
    PLEASE WAIT AROUND 30 SEC.

                *
ADJUSTMENT POINT 0 1 2 3 4 5 6 7 8 9 A B C
```

```
    << ADJUSTMENT OF HALLCURVE >>
    PLEASE WAIT AROUND 30 SEC.

                * * * * * * * * * * * * *
ADJUSTMENT POINT 0 1 2 3 4 5 6 7 8 9 A B C
    DATA WRITEN INTO EEPROM
    ADJUSTMENT FINISHED
        PRESS ANY KEY
```

Press any key to return to ADJUSTMENT MENU.
Turn the power off for 5 seconds and then on again.

Note: 1. With some units the following parameter may not be displayed in the display marked §1.
This is normal; continue adjustment.
ROUGH ADJUSTMENT: xx TIMES
2. The * mark flashes above the numerals and letters in sequence in the display marked §2.

(2) Knee Adjustment (Fig. 3-19)

Purpose:	To determine the knee level.
Incompleted phenomenon:	Color in the very bright section is defective.
Test Point:	Video out (AV OUT)
Equipment:	Ocsilloscope (Waveform monitor)
Condition:	Point the camera at the gray scale chart.

Procedure:

ADJUSTMRNT MENU

```
************************************************
      MANUAL ADJUSTMENT PROGRAM
************************************************
                    :
          [2]   KNEE
                    :
```

Press **2** key to select the KNEE.

```
        << KNEE ADJUSTMENT >> STEP 1
* THIS ADJUSTMENT ONLY NEEDED AFTER
                REPLACING IC1101 OR IC1107.
* The [1] IRIS CONTROL ADJUSTMENT SHOULD
    HAVE JUST BEEN COMPLETED BEFORE
          PERFORMING THE FOLLOWING KNEE
                    ADJUSTMENT PROCEDURE.
PLEASE POINT AT THE CHART AND
                PRESS THE FOLLOWING KEY
    RETURN TO MENU      [ESC]
    GO TO NEXT STEP     [ENTER]
```

Press [Enter] key.

```
        << KNEE ADJUSTMENT >> STEP 1
            << WAIT A MOMENT >>
```

```
        << KNEE ADJUSTMENT >> STEP 2

SET LUMINANCE LEVEL TO
                100 (+/- 5) IRE OR 715 (+/- 35) mV
        ROUGH ADJUSTMENT
          [U]       UP
          [D]       DOWN
        FINE ADJUSTMENT
          [Ctrl]+[U]    UP
          [Ctrl]+[D]    DOWN
          [ENTER]       DICISION
```

Press the **U** and **D** keys to set the amplitude level to around 715mVp-p.
Press the [Ctrl] key and hold it down, then press the **U** and **D** keys to adjust the amplitude level 715mVp-p ± 35mV.

Press [Enter] key.

```
        << KNEE ADJUSTMENT >> STEP 3
ADJUST THE LUMINANCE LEVEL TO
      MATCH THE LEVEL FROM STEP 2
        ROUGH ADJUSTMENT
          [U]       UP
          [D]       DOWN
        FINE ADJUSTMENT
          [Ctrl]+[U]    UP
          [Ctrl]+[D]    DOWN

          [C] REREAD THE LEVEL FROM STEP 2
          [ENTER]   DICISION
```

Press the **U** and **D** keys to bring the amplitude level near to the level in step 2.
Press the [Ctrl] key and hold it down, then press the **U** and **D** keys to match the amplitude level to that in step 2.

Note: Press the **C** key. The level in step 2 can be checked.

```
        << KNEE ADJUSTMENT >> STEP 3
WAVEFORM ON OSCILLOSCOPE IS NOW
DISPLAYING AMPLITUDE AS SET IN STEP 2
(PRESS C TO RETURN TO STEP 3 MENU)
```

Press [Enter] key.

```
        << KNEE ADJUSTMENT >> STEP 3
            WRITING EEPROM NOW
```

```
        << KNEE ADJUSTMENT >>
              COMPLETE
          PRESS ANY KEY
```

Press any key to return to ADJUSTMENT MENU.

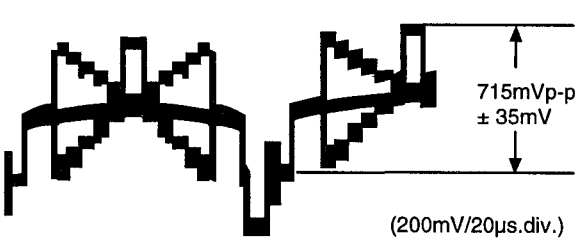


Fig. 3-19

(3) Matrix Adjustment (Fig. 3-20)

Purpose:	To compensate for uneveness in the chroma signal.
Incompleted phenomenon:	Color reproduction becomes defective.
Test Point:	Video out (AV OUT)
Equipment:	Ocsilloscope
Condition:	Point the camera at the colour bar chart.

Procedure:

ADJUSTMRNT MENU

```
**************************************************
        MANUAL ADJUSTMENT PROGRAM
**************************************************
                    :
          [3]   MATRIX
                    :
```

Press **3** key to select the MATRIX.

```
<< ADJUSTMENT OF BLUE MATRIX >>
          ROUGH ADJUSTMENT
    [U]           UP
    [D]           DOWN
          FINE ADJUSTMENT
    [Ctrl] + [U]  UP
    [Ctrl] + [D]  DOWN

    [ENTER]       SAVE & RETURN TO MENU
    [ESC]         QUIT
```

Press the **D** key to minimize the yellow (YEL) level.
Press the **U** key so the ratio between yellow (YEL) and blue (BLU) levels is 1:2.
Press the [Ctrl] key and hold it down, then press the **U** and **D** keys so the ratio between yellow (YEL) and blue (BLU) levels is 1:2.

Press [Enter] key, and the dispaly changes as follows.

```
<< ADJUSTMENT OF BLUE MATRIX >>
DATA WRITING TO EEPROM
```

```
<< ADJUSTMENT OF BLUE MATRIX >>
ADJUSTMENT FINISHED
PRESS ANY KEY
```

Press any key to return to ADJUSTMENT MENU.

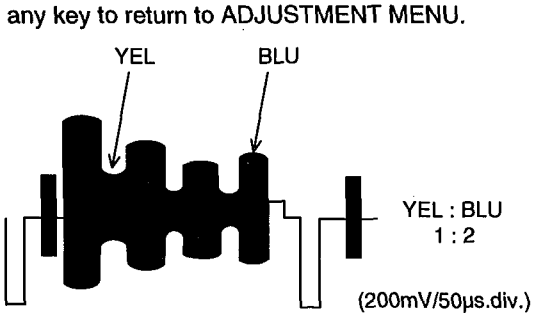


Fig. 3-20

(4) White Balance Adjustment

Purpose:	To set white balance under the color temperature which becomes a reference for the auto white balance circuit.
Incompleted phenomenon:	Color of the subject is different from that of the picture. A white subject is not seen as white.
Test Point:	Video out (AV OUT)
Condition:	Attach a C12 filter. Point the camera at the gray scale chart (wide angle).

Procedure:

ADJUSTMRNT MENU

```
**************************************************
        MANUAL ADJUSTMENT PROGRAM
**************************************************
                    :
          [4]   WHITE BALANCE
                    :
```

Press **4** key to select the WHITE BALANCE.

```
<< WHITE BALANCE ADJUSTMENT >>
INPUT DATA OF OFFSET  FOR R-B --> 00
```

Press **0**(ZERO)**0**(ZERO) to input the data.

Press [Enter] key, and the display changes as follows.

```
<< WHITE BALANCE ADJUSTMENT >>
INPUT DATA OF OFFSET  FOR Mg-G --> 00
```

Press **0**(ZERO)**0**(ZERO) to input the data.

Press [Enter] key, and the display changes as follows.

```
<< WHITE BALANCE ADJUSTMENT >>
PLEASE WAIT A MOMENT.
```

```
<< WHITE BALANCE ADJUSTMENT >>
ADJUSTMENT COMPLETED.
COMPLETED EEPROM WRITE.
PRESS ANY KEY.
```

Press any key to return to ADJUSTMENT MENU.

(5) Chroma Gain Adjustment (Figs. 3-21, 3-22)

Purpose:	To set the color saturation under the reference color temperature.
Incompleted phenomenon:	Color of the picture is denser than that of the subject. Color of the picture is lighter than that of the subject.
Test Point:	Video out (AV OUT)
Equipment:	Ocsilloscope (Vectroscope)
Condition:	Attach a C12 filter. Point the camera at the color bar chart.

Procedure:

ADJUSTMRNT MENU

```
**************************************************
        MANUAL ADJUSTMENT PROGRAM
**************************************************
                    :
          [5]   CHROMA GAIN
                    :
```

Press **5** key to select the CHROMA GAIN.

```
    « ADJUSTMENT OF CHROMA GAIN »
ROUGH ADJUSTMENT
[U]          CHROMA GAIN UP
[D]          CHROMA GAIN DOWN
FINE ADJUSTMENT
[Ctrl] + [U]  CHROMA GAIN UP
[Ctrl] + [D]  CHROMA GAIN DOWN

[ENTER]      SAVE & RETURN TO MENU
[ESC]        QUIT
```

WHEN USING AN OSCILLOSCOPE:

Press the **U** and **D** keys to set the red level to around 450mVp-p.

Press the [Ctrl] key and hold it down, then press the **U** and **D** keys so the red level is 450mV ± 20mVp-p. (Fig. 3-21)

WHEN USING A VECTORSCOPE:

Press the **U** and **D** keys to set the red vector to around 160% of the burst.

Press the [Ctrl] key and hold it down, then press the **U** and **D** keys so the red vector is 160% ± 5%. (Fig. 3-22)

Press [Enter] key, and the display changes as follows.

```
<< ADJUSTMENT OF CHROMA GAIN >>
DATA WRITING EEPROM.
```

```
<< ADJUSTMENT OF CHROMA GAIN >>
ADJUSTMENT FINISHED.
PRESS ANY KEY.
```

Press any key to return to ADJUSTMENT MENU.

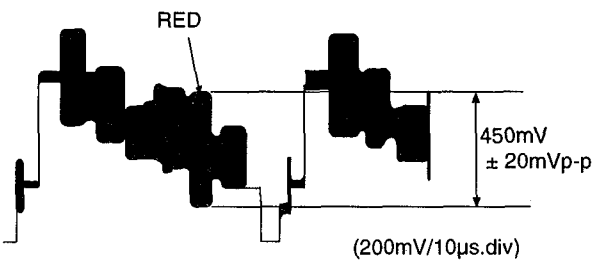


Fig. 3-21

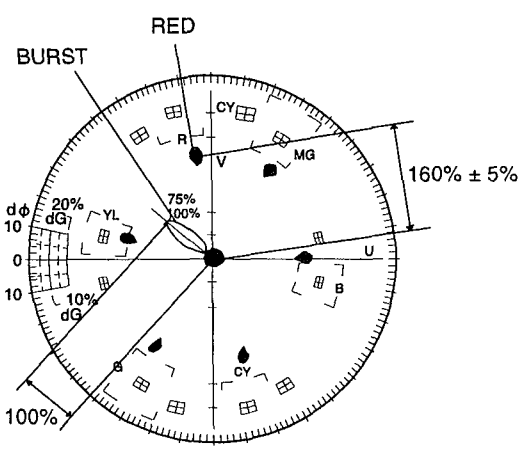


Fig. 3-22

1.8.5 Autofocus Adjustment Procedure

Note: 1. Be sure to perform this adjustment after replacing or initializing the lens block, parts in the autofocus circuit and SPC circuit board (EEPROM).
2. When an error message appears during adjustment, refer to "Error Massages".

1) Start the MAP, referring to "1.8.1 How to Start the Adjustment Program (MAP)".

2) Press **D** to select AUTO FOCUS. (Figs. 3-23, 3-24, 3-25)

3) Select the number of the required adjustment. (If [ESC] (escape) is pressed, the computer's display returns to MAIN MENU).

Note: To complete adjustment, press the [ESC] (escape) twice to restore the MS-DOS screen and then turn off the camera/recorder and jig.

MAIN MENU

```
**************************************************
        MANUAL ADJUSTMENT PROGRAM
**************************************************
            [A]   DATA INITIALIZE
            [B]   ELECTRIC VOLUME
            [C]   ADJUSTMENT
            [D]   AUTO FOCUS
            [E]   SPOT NOISE
            [ESC] END
        PRESS SELECT [A] - [E] OR [ESC]
```

Fig. 3-23

Press **D** key.

```
Data loading now
Please wait
```

Fig. 3-24

AF ADJ. MENU

```
**************************************************
        AUTO FOCUS ADJUSTMENT
**************************************************
[1]   ADJUSTMENT OF ZOOM/FOCUS TRACKING
[2]   ADJUSTMENT OF AF NOISE LEVEL
[ESC] RETURN TO MENU
        PLEASE SELECT [1], [2] OR [ESC]
```

Fig. 3-25

(1) Zoom/Focus Tracking Adjustment

Purpose:	To set the out-of-focus correction level during zooming.
Incompleted phenomenon:	Focus is lost during zooming.
Test Point:	Video out (AV OUT)
Equipment:	Color video monitor
Condition:	Point the camera at the backfocus chart, 1500 ± 5mm away from the lens surface. Light the chart with 200 - 400 lux.

Procedure:

Note: 1. Measure the distance between the chart and lens surface precisely.
2. Place the chart as parallel as possible to the lens surface.
3. The backfocus chart should always be at the center of the monitor screen when the zoom is set to the wide-angle and telephoto ends.
4. The zoom trace adjustment procedure is completed within 2 minutes after it is selected.
5. Do not place any obstruction between the lens and chart during adjustment.

AF ADJ. MENU

```
**************************************************
        AUTO FOCUS ADJUSTMENT
**************************************************
[1]   ADJUSTMENT OF ZOOM/FOCUS TRACKING
                :
```

Press **1** key to select ADJUSTMENT OF ZOOM/FOCUS TRACKING.

```
<< ADJUSTMENT OF ZOOM/FOCUS TRACKING >>

        |         |         |
       0%       50%      100%
```

```
<< ADJUSTMENT OF ZOOM/FOCUS TRACKING >>

        ■■■■■■■■■■■■■■■■■■■■■
       0%       50%      100%
```

Press any key to return to AF ADJ. MENU.

(2) AF Noise Level Adjustment

Purpose:	To set the noise level.
Incompleted phenomenon:	It takes time until a subject is brought into focus.
Test Point:	Video out (AV OUT)
Equipment:	Color video monitor
Condition:	Set the focus to AUTO. Point at alight box without a chart inserted at a distance of up to 10cm.
Procedure:	

Note: 1. Place the light box as parallel as possible to the lens surface.
2. The AF noise level adjustment procedure will be completed within 30 seconds after it is selected.

AF ADJ. MENU

```
************************************************
          AUTO FOCUS ADJUSTMENT
************************************************
                    :
[2]    ADJUSTMENT OF AF NOISE LEVEL
                    :
```

Press **2** key to select ADJUSTMENT OF AF NOISE LEVEL.

```
<< ADJUSTMENT OF AF NOISE LEVEL >>

        |         |         |
       0%       50%      100%
```

```
<< ADJUSTMENT OF AF NOISE LEVEL >>

        ■■■
```

MAIN MENU

```
**************************************************
        MANUAL ADJUSTMENT PROGRAM
**************************************************
                    :
        [E]     SPOT NOISE
                    :
```

Press **E** key .

```
SEARCHING SPOT NOISE NOW.
PLEASE WAIT A MOMENT.
```

Note: The amount of spot noise is display in place marked ×.

One spot noise

```
**********************************
      SPOT NOISE COMPENSATE
**********************************
      A SPOT NOISE FOUND.
      PRESS ANY KEY.
```

Much spot noise

```
**********************************
      SPOT NOISE COMPENSATE
**********************************
      × SPOT NOISE FOUND.
      PRESS ANY KEY.
```

Spot noise is not defected (When camera/recorder free from spot noise are adjusted)

```
**********************************
      SPOT NOISE COMPENSATE
**********************************
      CANNOT FIND THE SPOT NOISE.
      PRESS ANY KEY.
```

Press any key to return to MAIN MENU.

Press any key.

```
**************************************************
        SPOT NOISE COMPENSATE
**************************************************
   CAN YOU SEE THE BLINKING CURSOR ?(Y/N)
```

← **(A)**

A cursor blinks in the section where spot noise occurs on the monitor screen.

YES

Press **Y** Key.

```
**************************************************
        SPOT NOISE COMPENSATE
**************************************************
        LOOK AT THE CURSOR POINT.
   WHILE YOU CAN SEE THE SPOT NOISE,
                    PRESS SPACE KEY.
   IF THE SPOT NOISE CLEARS,
                THEN PRESS ENTER KEY.
```

Check whether or not spot noise disappears after auto adjustment is completed.

If it does not disappear: Press the space key.
If it disappears: Press the enter key.

NO

Press **N** Key.

```
**************************************************
        SPOT NOISE COMPENSATE
**************************************************
   THIS SPOT NOISE IS IN THE
                BLANKING AREA OF TV.
        PRESS ANY KEY.
```

Press any key.

There are other occurrences of spot noise. → **(A)**

Spot noise compensation is completed.

```
**************************************************
        SPOT NOISE COMPENSATE
**************************************************
                COMPLETE.
        PRESS ANY KEY.
```

Press any key to Return to MAIN MENU.

1.8.7 Electronic Viewfinder (EVF) Adjustment Procedure

(1) Defelection Yoke Position Adjustment (Fig. 3-51)

Purpose:	This adjustment procedure eliminates picture tilt in the EVF display.
Equipment:	EVF display
Adjust:	Deflection yoke
Condition:	Point the camera at the resolution chart.
Procedure:	

1) Loosen the deflection yoke nut.
2) Turn the deflection yoke so that the EVF picture (chart) is horizontal, matching the edges of the CRT.
3) After adjustment is completed, tighten the deflection yoke nut.

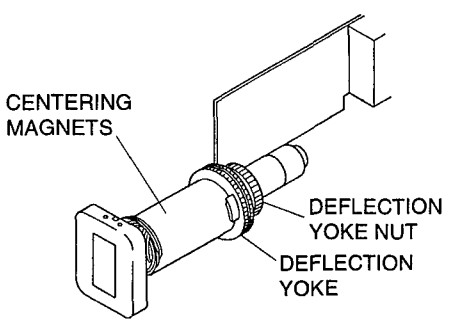


Fig. 3-51

(2) EVF Centering Adjustment (Fig. 3-51)

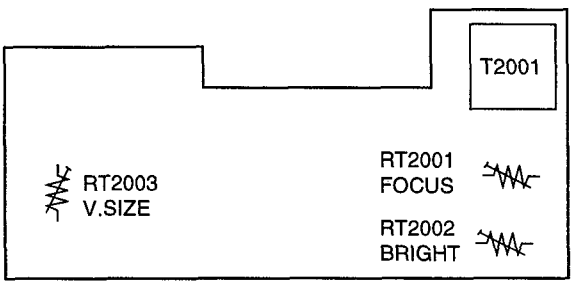
Purpose:	This adjustment center the image observed by the camera in the EVF.
Equipment:	EVF display
Adjust:	Centering magnets
Condition:	Point the camera at the resolution chart.
Procedure:	

1) Remove the locking paint from the centering magnet.
2) Adjust the centering magnets until the center of the picture viewed by the camera is positioned in the center of the EVF display.

(3) EVF Vertical Size Adjustment (Fig. 3-52)

Purpose:	This adjustment determines the vertical size of the image appearing in the EVF display.
Equipment:	EVF display
Adjust:	RT2003 (V.SIZE) [on the EVF]
Condition:	Point the camera at the resolution chart.
Procedure:	

1) Adjust RT2003 so that the top and bottom edges of the chart match the top and bottom edges of the CRT screen.



EVF Circuit Board [Parts Side]

Fig. 3-52

(4) EVF Brightness Adjustment (Fig. 3-52)

Purpose:	This adjustment sets the brightness of the picture in the EVF display.
Equipment:	EVF display
Adjust:	RT2002 (BRIGHT) [on the EVF]
Condition:	Point the camera at the resolution chart.
Procedure:	

1) Adjust RT2002 to optimize the EVF picture.

(5) EVF Focus Adjustment (Fig. 3-52)

Purpose:	This control adjusts for optimum focus of the electronic viewfinder picture.
Equipment:	EVF display
Adjust:	RT2001 (FOCUS) [on the EVF]
Condition:	Point the camera at the resolution chart.
Procedure:	

1) Adjust RT2001 so that the EVF picture is clear.

2. VCR SECTION ADJUSTMANTS

2.1 CIRCUIT BOARD LOCATION

1. SPC (Sensor/Process) Circuit Board
2. TSS (Supply Sensor) Circuit Board
3. ERS (Take-up Sensor) Circuit Board
4. SWS (Main) Circuit Board
5. CON (Control) Circuit Board

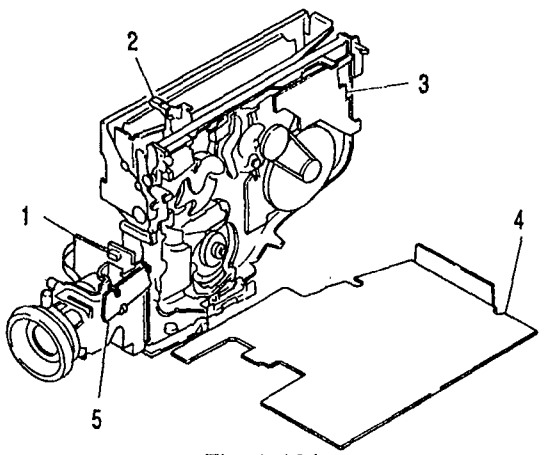


Fig. 3-101

2.2 TEST EQUIPMENT NECESSARY FOR ADJUSTMENT

Test Equipment

Oscilloscope (dual trace)
Color Video Monitor

Jigs, etc.

Alignment Tape
DC Power Supply (DC9.6V/3A)

2.3 ADJUSTMENT CONDITION

1) Check that the camera section has been adjusted correctly before adjusting the VCR section.
2) Connect this unit, a power supply and a color video monitor as shown in Fig. 3-102.
3) When using the video out (AV OUT) to perform adjustment, be sure to terminate the AV OUT jack with 75 ohms.
4) Use the 10:1 probe of the oscilloscope when otherwise not specified.

2.4 PRESET POSITIONS OF SWITCHES AND CONTROLS DURING ADJUSTMENT

CAM/OFF/VIDEO switch ····· "VIDEO" position
LIGHT switch ····· "OFF" position
AV IN/OUT ····· "OUT" position

Note: The tracking is reset to the center each time the cassette ejected. (The zoom button operates as the tracking button during play.)

2.5 CONNECTION FOR ADJUSTMENT

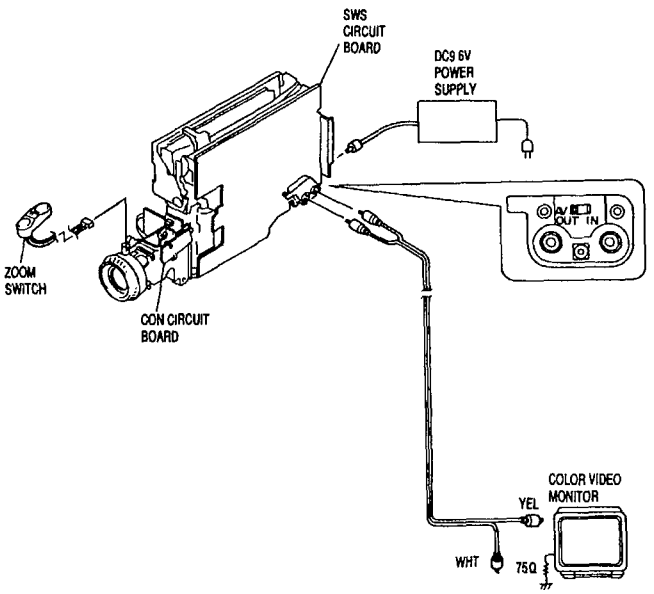


Fig. 3-102

2.6 ADJUSTMENT COMPONENTS LOCATIONS

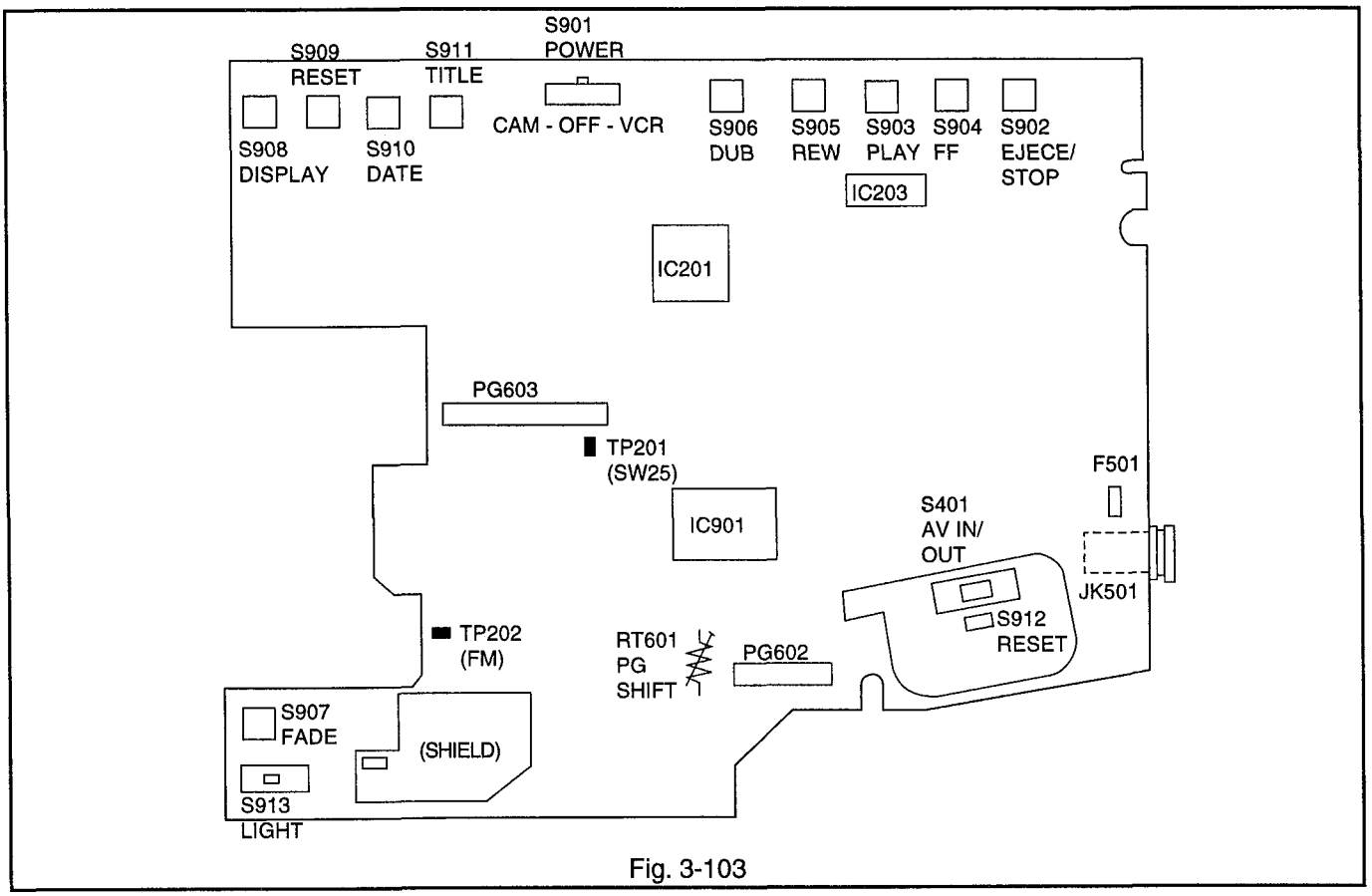


Fig. 3-103

2.7 ADJUSTMENT PROCEDURE

2.7.1 Servo Circuit Adjustment Procedure

(1) Head Switching Point Adjustment (Fig. 3-104)

Note: Be sure to perform this adjustment after replacing the cylinder assembly and main circuit board.

Purpose:	To set the switching point of the video heads during playback.
Incompleted phenomenon:	Vertical jitter occure. Switching noise appears across the bottom of the monitor screen.
Test Point:	Video out (AV OUT) TP201 (SW25) [on the MAIN]
Equipment:	Oscilloscope Alignment tape
Adjust:	RT601 (PG SHIFT) [on the MAIN]
Condition:	Playback the alignment tape.
Procedure:	

1) Connect the oscilloscope to video out.
2) Connect the oscilloscope to TP201 (SW25).
3) Trigger the oscilloscope at SW25Hz.
4) Set the oscilloscope to the (-) slope.
5) Adjust that the trailing edge of the SW25Hz signal is 6.5H ± 0.5H (horizontal) line before the start of channel-1 vertical sync.
6) Set the oscilloscope to the (+) slope and confirm that the leading edge of the SW25Hz signal is 6.5H ± 0.5H (horizontal) line before the start of channel-2 vertical sync.

Note: The waveform of channel-1 and channel-2 video signals in the diagram may be opposite depending on the alignment tape.

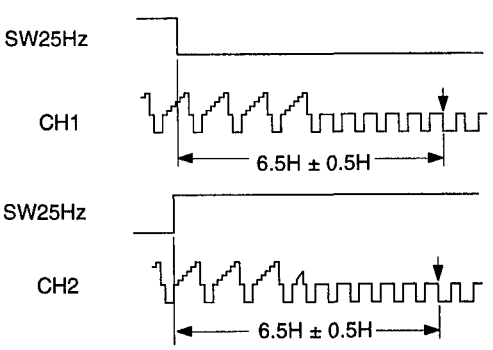


Fig. 3-104

(2) X-Value Adjustment (Figs. 3-105, 3-106)

Note: The tracking is reset to the center each time the cassette ejected. (The zoom button operates as the tracking button during play.)
Be sure to perform this adjustment after replacing the cylinder assembly and audio control head.

Purpose:	To obtain compatibility with other VCRs.	
Test Point:	TP202 (FM)	[on the MAIN]
	TP201 (SW25)	[on the MAIN]
Equipment:	Oscilloscope	
	Alignment tape	
Adjust:	X-Value Adjustment Nut	
Condition:	Playback the alignment tape.	
Procedure:		

1) Connect the oscilloscope to TP202 (FM).
2) Connect the oscilloscope to TP201 (SW25).
3) Trigger the oscilloscope at SW25Hz.
4) Set the tracking control to center position.
5) Playback the color bar signal on the alignment tape.
6) Adjust the X-value adjustment nut so the siganl at TP202 (FM envelope) is maxmum.
Press the two tracking control buttons (up and down) and check that the FM envelope becomes as shown in Fig. 3-106.

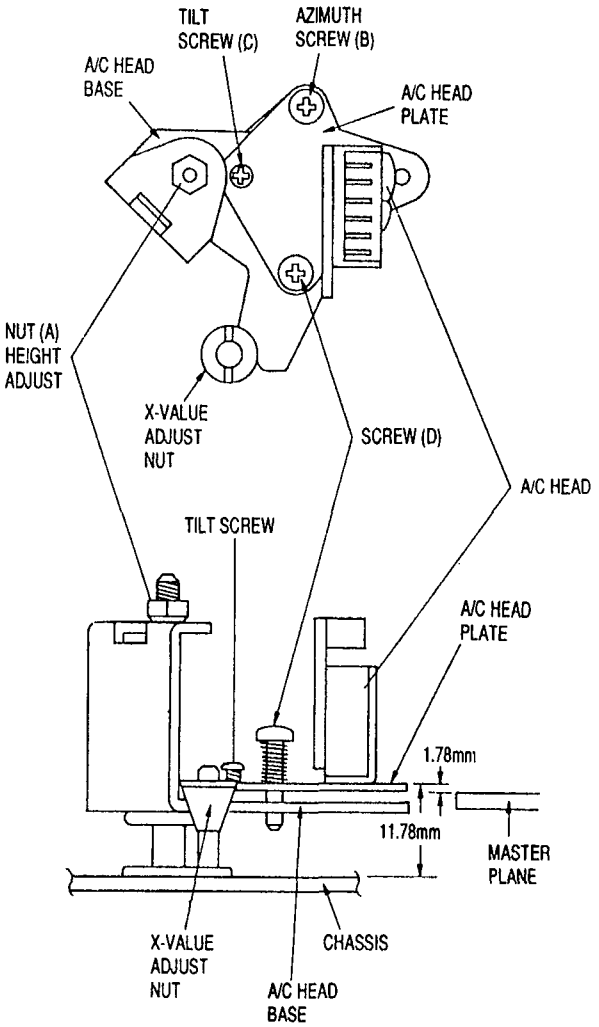


Fig. 3-105

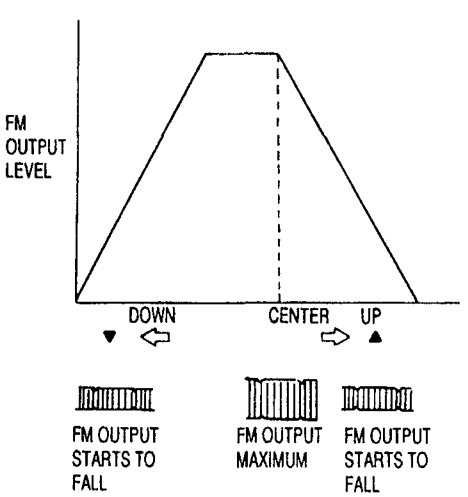


Fig. 3-106

3. ERROR MESSAGES

3.1 ERROR MESSAGES IN CAMERA ELECTRIC VALUE AND DIGITAL ADJUSTMENTS

ERROR MESSAGE	*COUNTERMEASURE*
ERROR OCCURRED. IRIS TROUBLE PRESS ANY KEY	Check whether or not power is supplied. Check the values of the iris drive circuit. Defective soldering, damage to pattern, etc. in the above circuit. Check the iris block and replace it if necessary.
ERROR OCCURRED ON da ADJUSTMENT PRESS ANY KEY	Check the values in the hall amp circuit. Defective soldering, damage to pattern, etc. in the above circuit.
D RANGE OVER. ERROR ON da ADJUSTMENT PRESS ANY KEY	Check the values in the hall amp circuit. Defective soldering, damage to pattern, etc. in the above circuit.
ERROR OCCURRED ON da0 and da1 ADJUSTMENT PRESS ANY KEY	Check the values in the hall amp circuit and its peripheral circuits. Defective soldering, damage to pattern, etc. in the above circuits.
FILE NOT FOUND !!!! PRESS ANY KEY	The adjustment program (file) cannot be found. Check the adjustment floppy disk and replace it if necessary.
FILE OPEN ERROR !!!! PRESS ANY KEY	The adjustment program (file) does not start. Check the adjustment floppy disk and replace it if necessary.
ERROR OCCURRED ON C DUTY ADJUSTMENT PRESS ANY KEY	Check the values of the iris drive circuit. Defective soldering, damage to pattern, etc. in the above circuit.
ERROR OCCURRED ON FDET ADJUSTMENT PRESS ANY KEY	Supply power again and re-adjust. Check the values in the hall amp circuit. Defective soldering, damage to pattern, etc. in the above circuit.
ERROR OCCURRED. ZOOM DOES NOT WORK PRESS ANY KEY	Supply power again and re-adjust.
TOO BRIGHT PRESS ANY KEY	The subject is too bright. Move the camera further away from the light box.
TOO DARK PRESS ANY KEY	The subject is too dark. Check the light box. Move the camera closer to the light box.
D RANGE OVER ERROR ON HALL AMP IRIS CANNOT OPEN ANY MORE PRESS ANY KEY	Supply power again and re-adjust. The subject is too dark. Check the light box. Move the camera closer to the light box. Check the values in the hall amp circuit. Defective soldering, damage to pattern, etc. in the above circuit.
STAURATION ERROR. TOO BRIGHT PRESS ANY KEY	The subject is too bright. Move the camera further away from the light box.
CAN'T ADJUSTMENT WHITE BALANCE PLEASE RETRY PRESS ANY KEY	The subject is too bright or too dark. Check the light box. Move the camera closer to or away from the light box. Supply power again and re-adjust.

3.2 ERROR MESSAGES IN AUTOFOCUS ADJUSTMENT

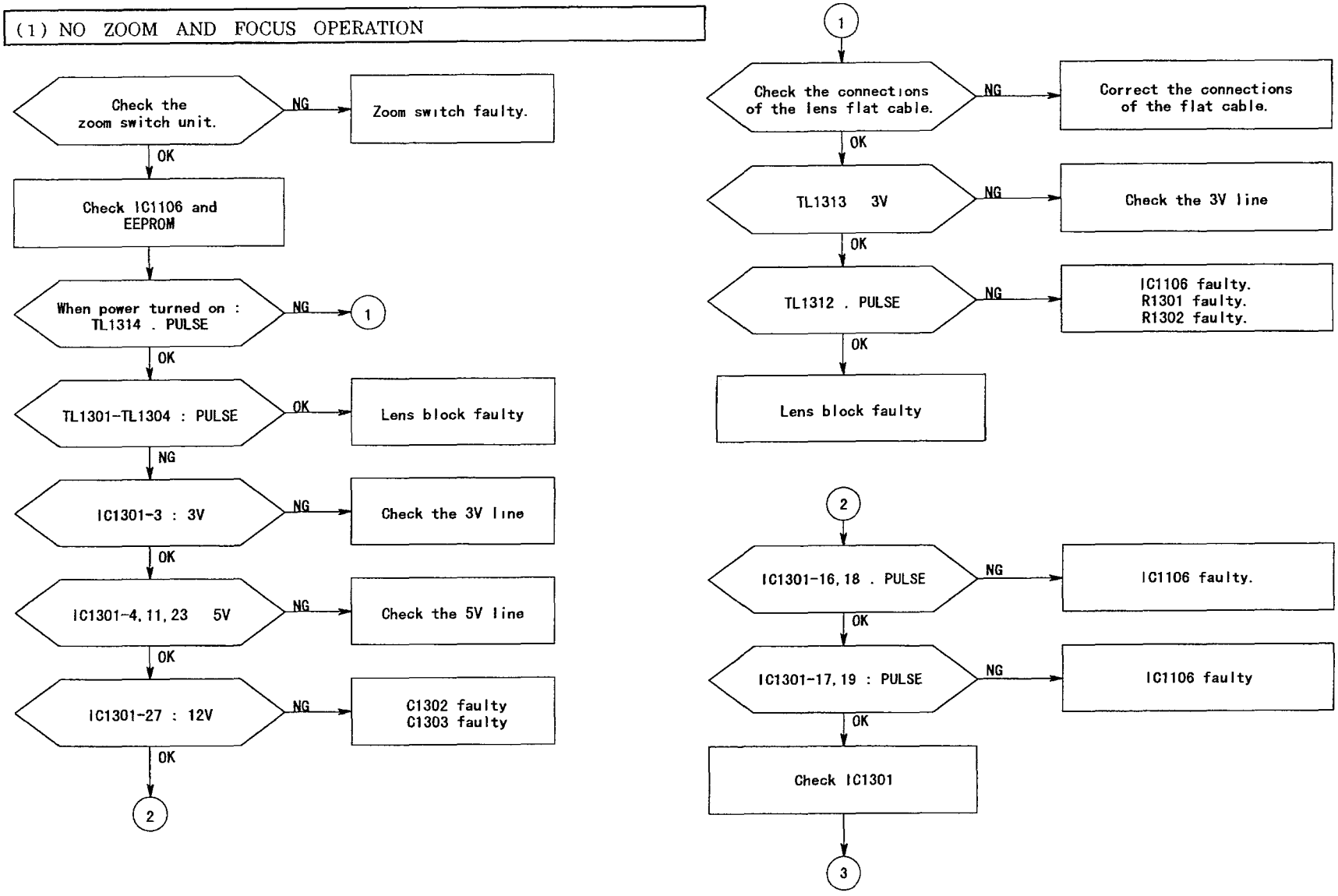
ERROR MESSAGE	*COUNTERMEASURE*
TIME OUT ERROR ON FOCUS	Check the conditions of subject. If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. Refer to (1) of TROUBLESHOOTING OF AUTOFOCUS.
TIME OUT ERROR ON ZOOM	If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. Refer to (2) of TROUBLESHOOTING OF AUTOFOCUS.
TIME OUT ERROR ON AF STEP	Check the conditions of subject. If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. Refer to (1) of TROUBLESHOOTING OF AUTOFOCUS.

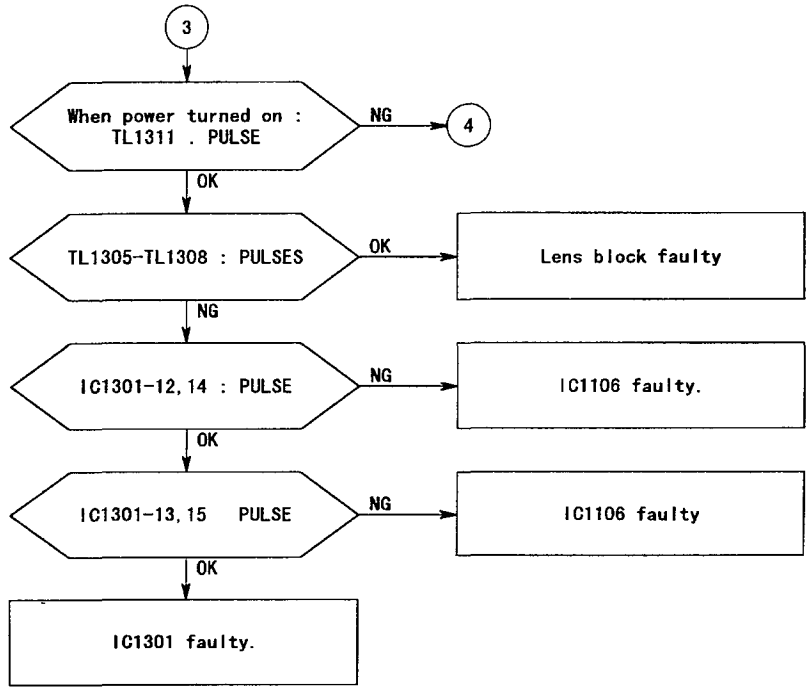
ERROR MESSAGE	*COUNTERMEASURE*
AF LIMIT OVER	Check the conditions of subject. If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. Refer to (2) of TROUBLESHOOTING OF AUTOFOCUS.
AF ERROR	If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. Refer to (1) of TROUBLESHOOTING OF AUTOFOCUS.
TOO DARK	Insufficient lighting. Check the subject.

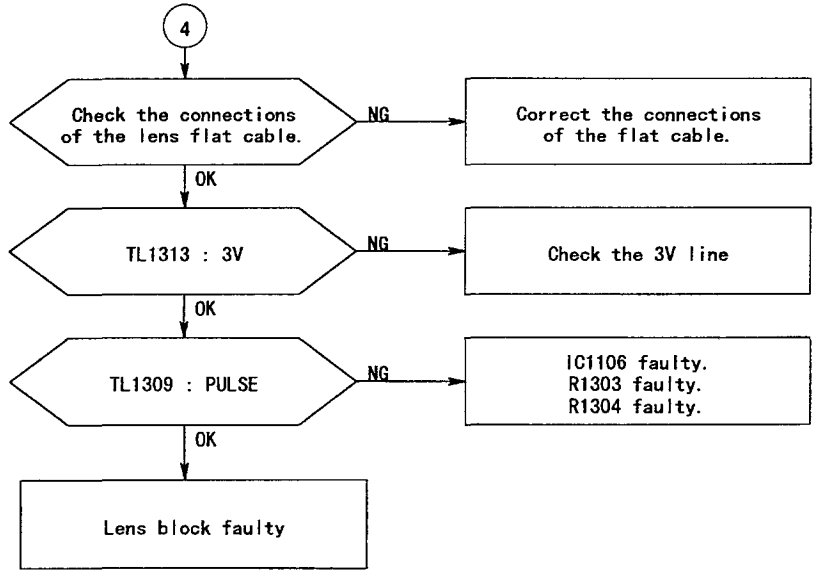
3.3 ERROR MESSAGES IN SPOT NOISE ADJUSTMENT

ERROR MESSAGE	*COUNTERMEASURE*
ERROR! ! SPOT NOISE COMPENSATION IS STOPPED BY INITIAL DATA. PLEASE CHECK THE EEPROM. PRESS ANY KEY.	Spot noise compensation is inhibited by the data in the EEPROM. Turn the power on again. Data in the EEPROM is defective. (Initialize it.) Check the EEPROM,and if necessary,replace it.
ERROR! ! THRESHOLD DATA ERROR. PLEASE CHECK THE EEPROM. PRESS ANY KEY.	Turn the power on again. Data in the EEPROM is defective. (Initialize it.) Check the EEPROM,and if necessary,replace it.
ERROR! ! THE SPOT NOISE IS TOO MANY. CAN NOT COMPENSATE ANY MORE. PRESS ANY KEY.	The amount of spot noise that can be compensatedreaches the limit. Turn the power on again. Check the CCD image sensor,and if necessary,replace it.

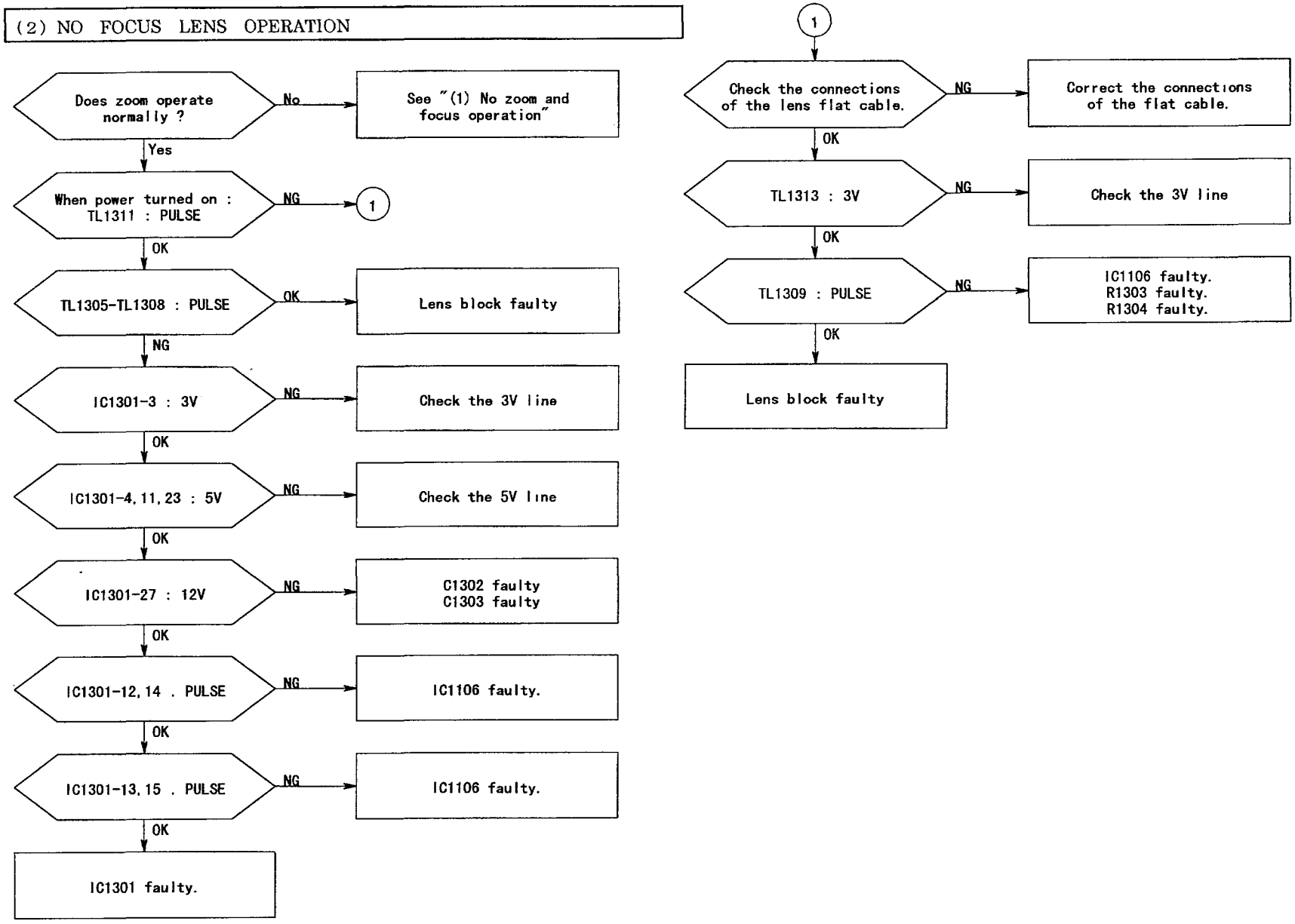
(1) NO ZOOM AND FOCUS OPERATION



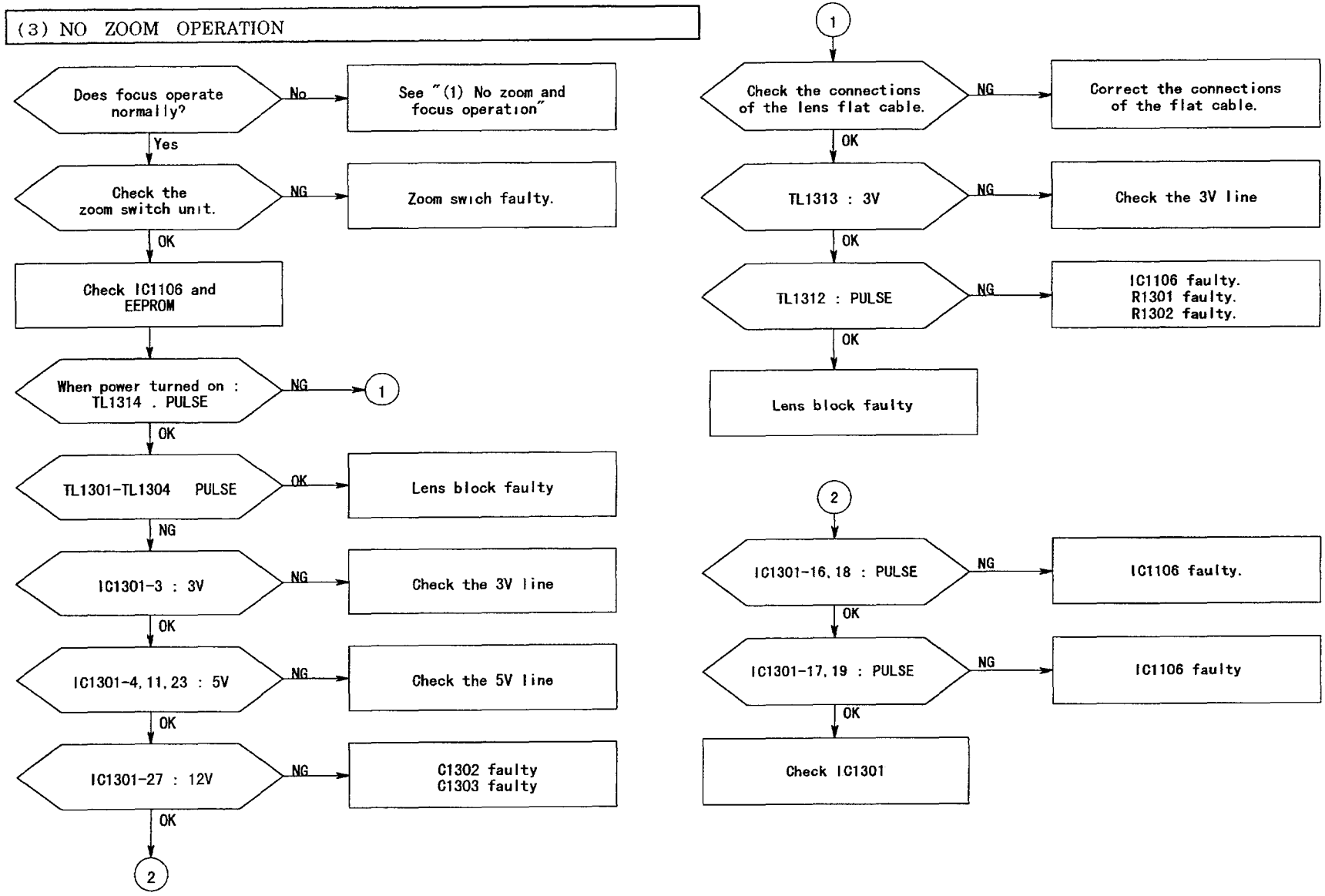

3
When power turned on :
TL1311 . PULSE
NG
4
OK
TL1305-TL1308 : PULSES
OK
Lens block faulty
NG
IC1301-12, 14 : PULSE
NG
IC1106 faulty.
OK
IC1301-13, 15 PULSE
NG
IC1106 faulty
OK
IC1301 faulty.


4
Check the connections
of the lens flat cable.
NG
Correct the connections
of the flat cable.
OK
TL1313 : 3V
NG
Check the 3V line
OK
TL1309 : PULSE
NG
IC1106 faulty.
R1303 faulty.
R1304 faulty.
OK
Lens block faulty

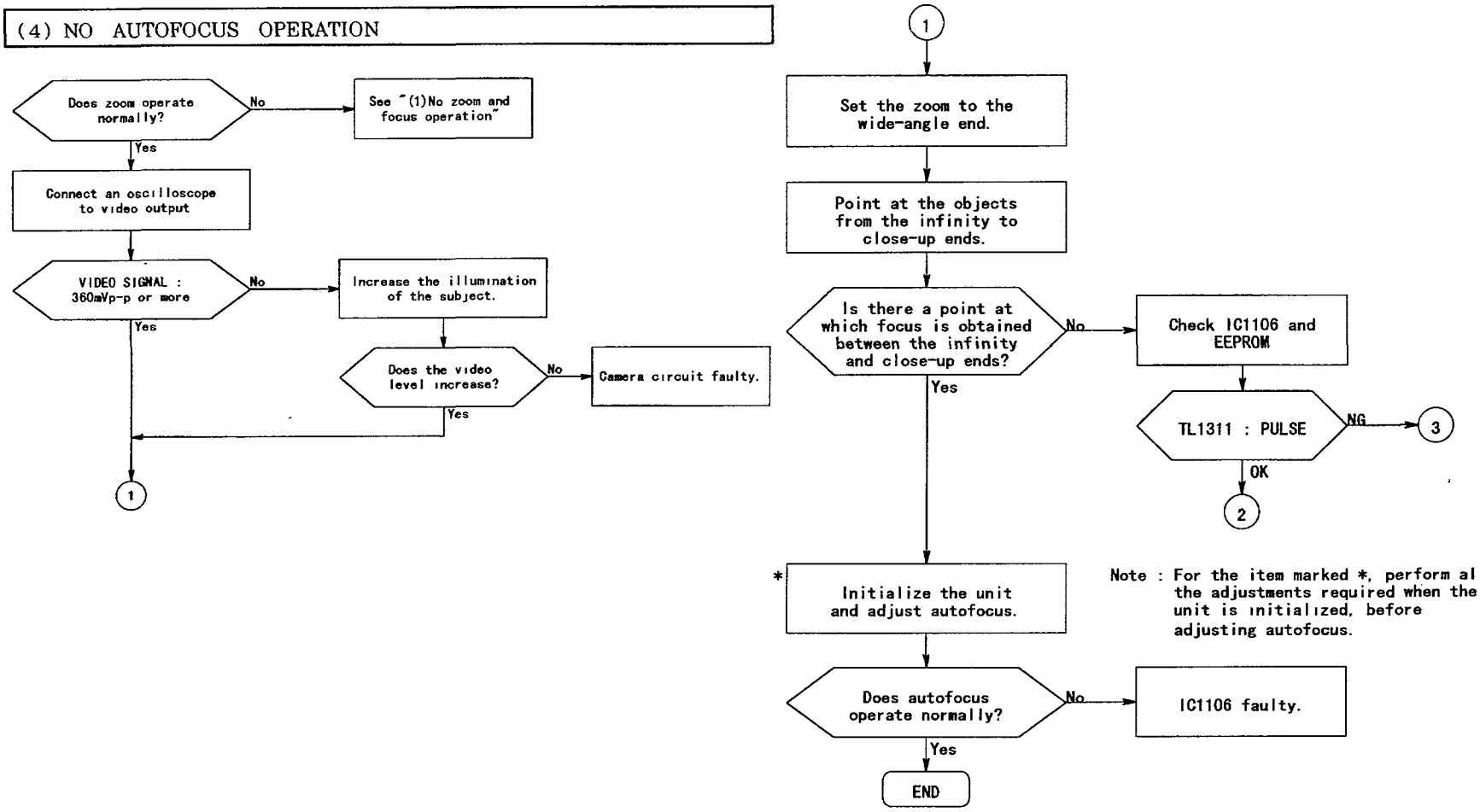
(2) NO FOCUS LENS OPERATION



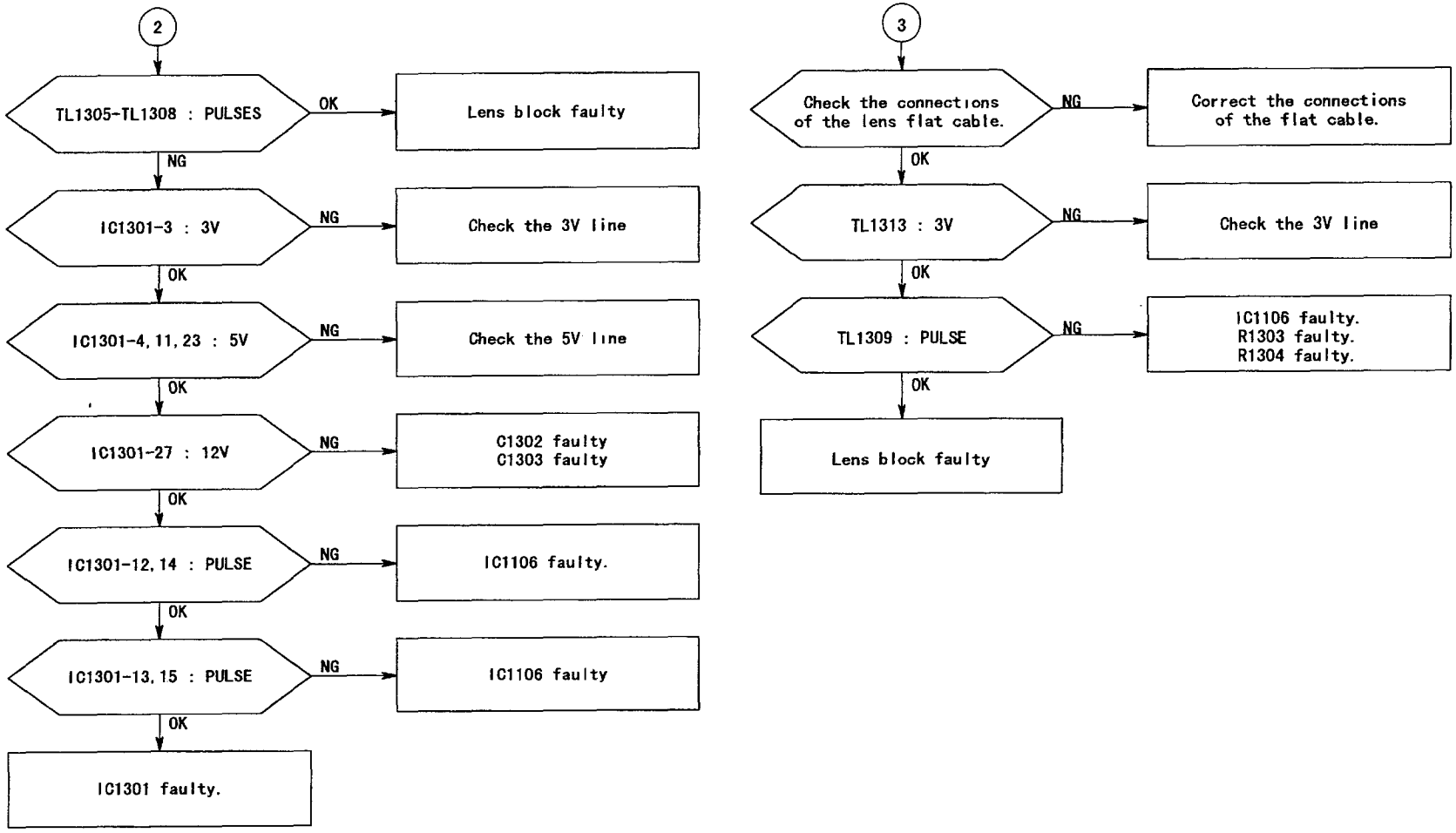
(3) NO ZOOM OPERATION



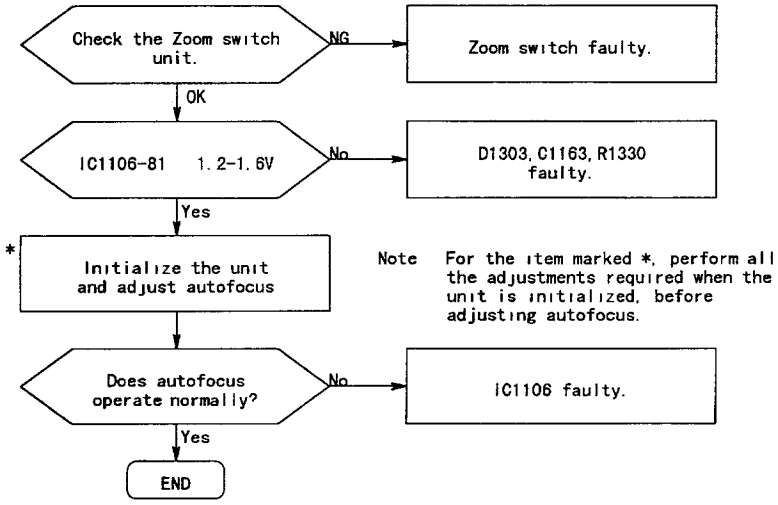
(4) NO AUTOFOCUS OPERATION



Note : For the item marked *, perform all the adjustments required when the unit is initialized, before adjusting autofocus.

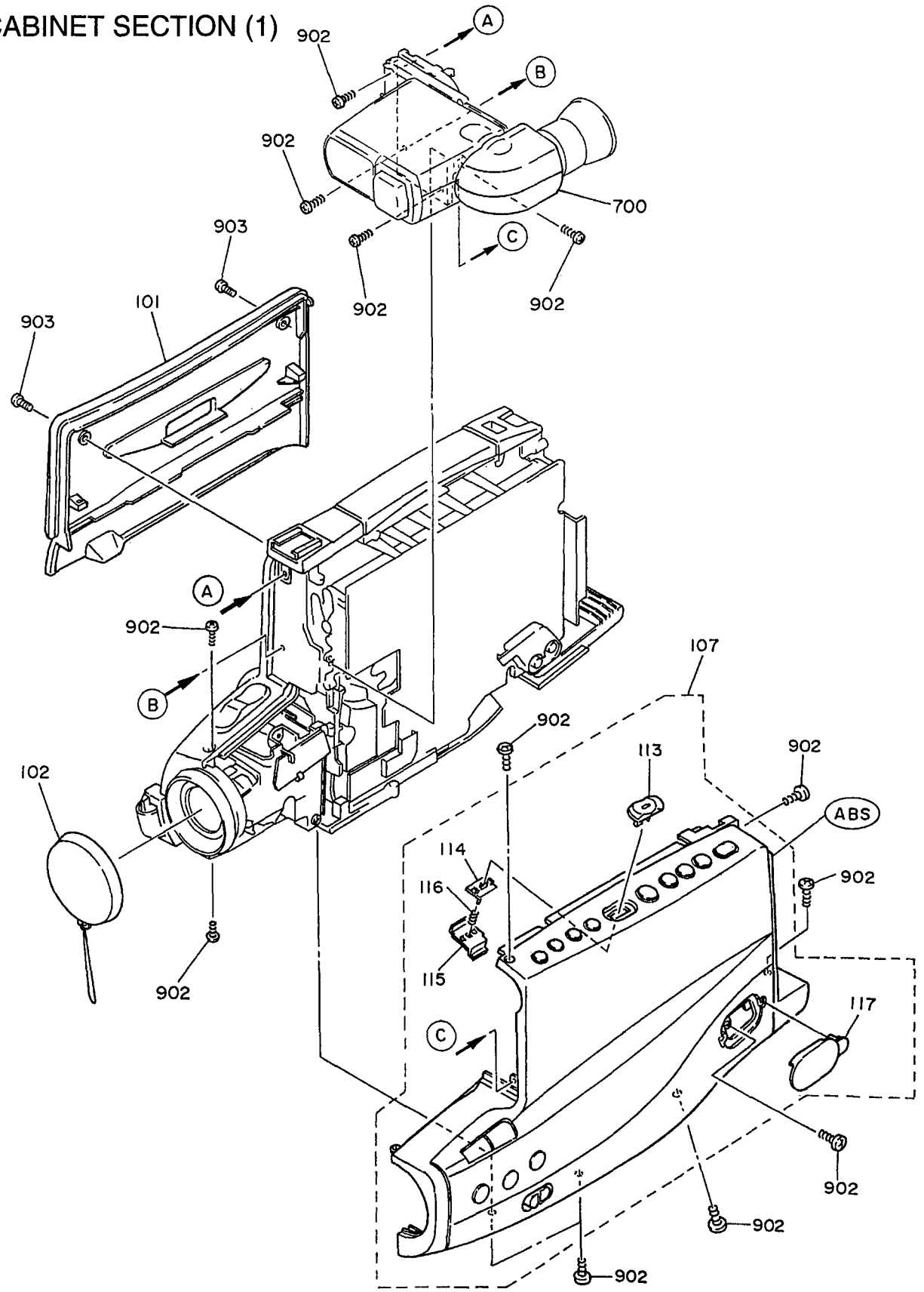

2
TL1305-TL1308 : PULSES
OK
Lens block faulty
NG
IC1301-3 : 3V
NG
Check the 3V line
OK
IC1301-4, 11, 23 : 5V
NG
Check the 5V line
OK
IC1301-27 : 12V
NG
C1302 faulty
C1303 faulty
OK
IC1301-12, 14 : PULSE
NG
IC1106 faulty.
OK
IC1301-13, 15 : PULSE
NG
IC1106 faulty
OK
IC1301 faulty.
3
Check the connections of the lens flat cable.
NG
Correct the connections of the flat cable.
OK
TL1313 : 3V
NG
Check the 3V line
OK
TL1309 : PULSE
NG
IC1106 faulty.
R1303 faulty.
R1304 faulty.
OK
Lens block faulty

(5) SUBJECT IS GREATLY OUT-OF-FOCUS WHEN ZOOMED.



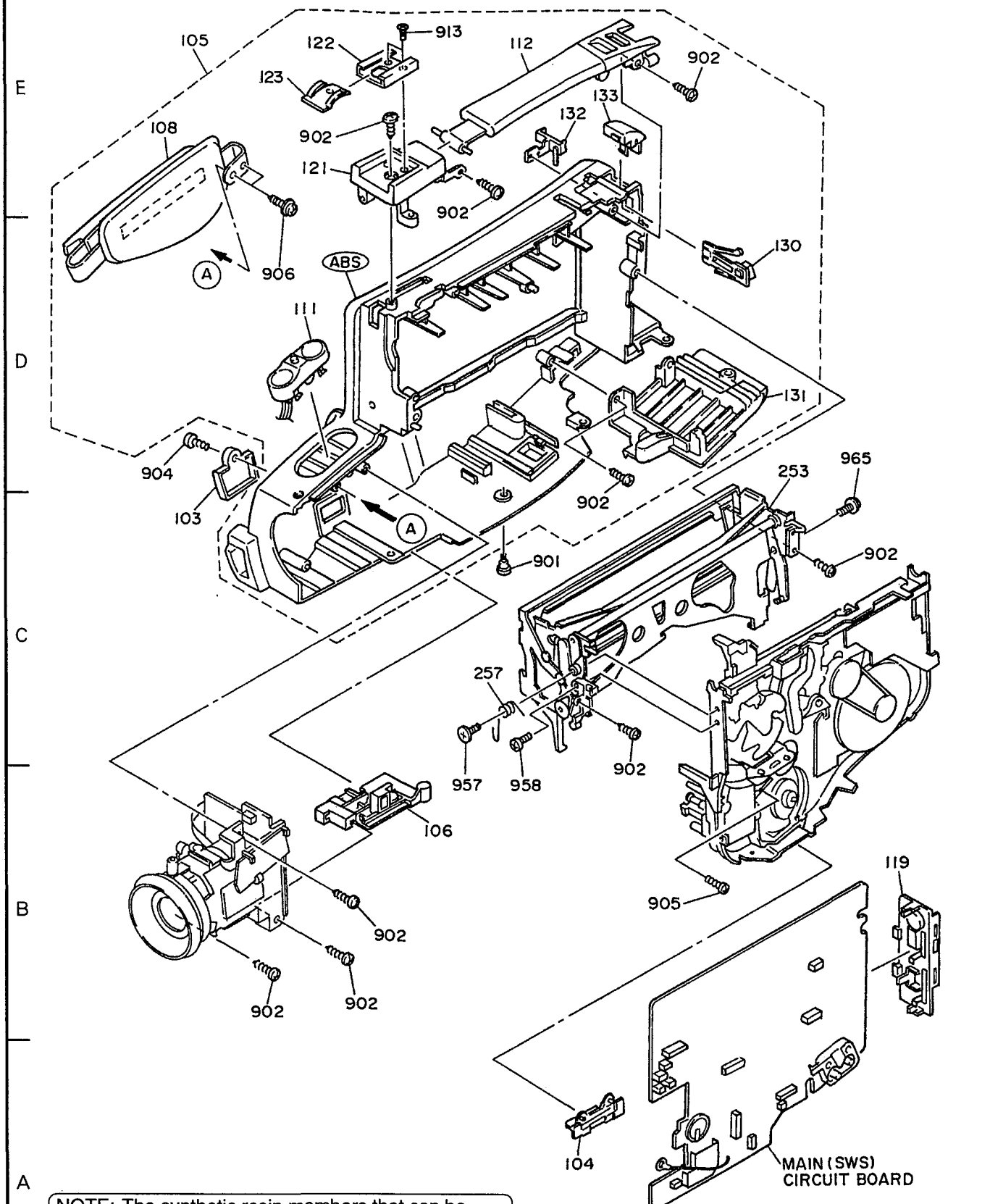
Note For the item marked *, perform all the adjustments required when the unit is initialized, before adjusting autofocus.

1. CABINET SECTION (1)



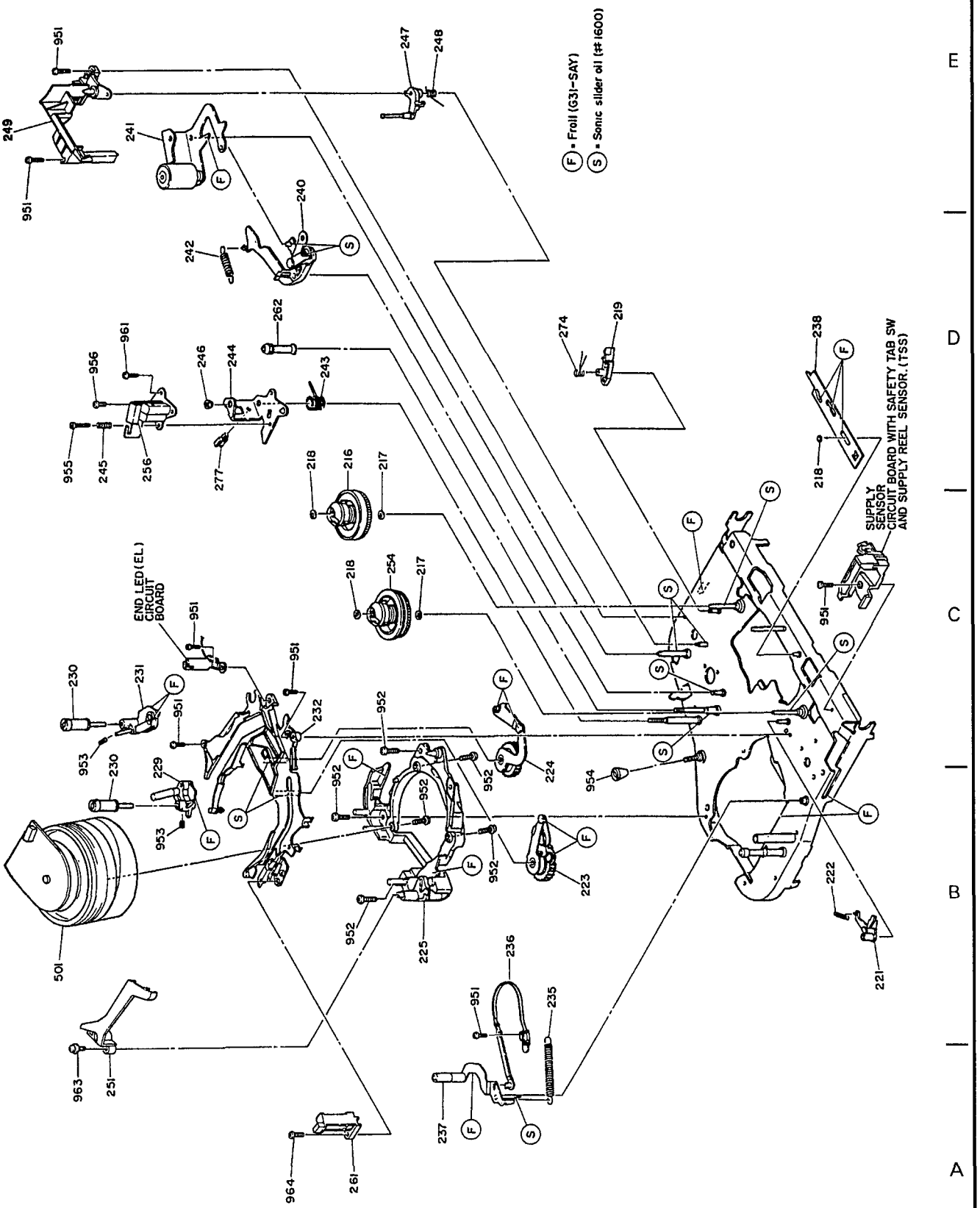
NOTE: The synthetic resin members that can be dismantled are shown by abbreviations using letters.

2. CABINET SECTION (2)



NOTE: The synthetic resin members that can be dismantled are shown by abbreviations using letters.

3. CHASSIS (TOP VIEW) SECTION

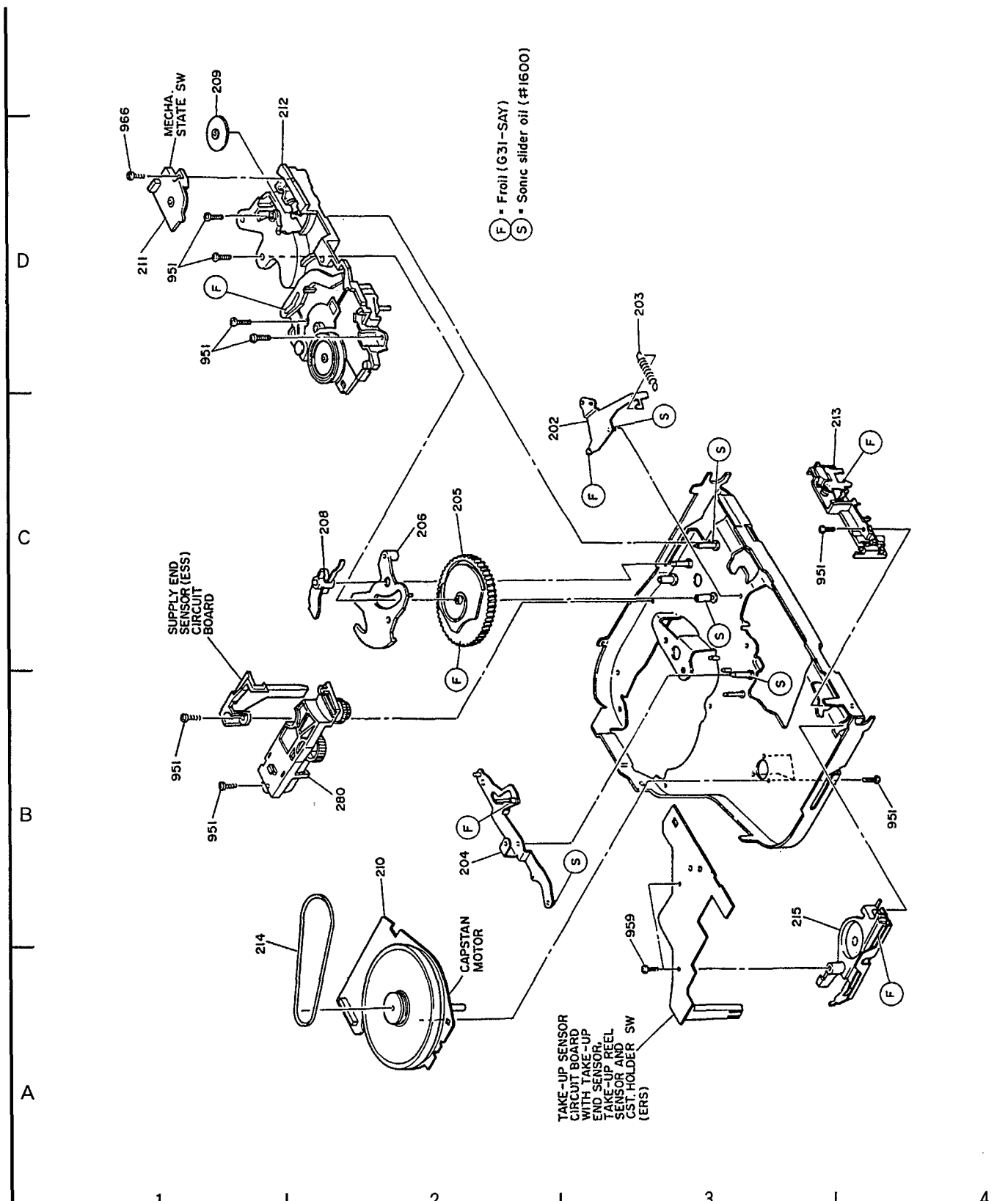

(F) = Frail (G3I-SAY)
(S) = Sonic slider oil (# 1600)
END LED (EL) CIRCUIT BOARD
SUPPLY SENSOR CIRCUIT BOARD WITH SAFETY TAB SW AND SUPPLY REEL SENSOR. (TSS)

4. CHASSIS (BOTTOM) SECTION

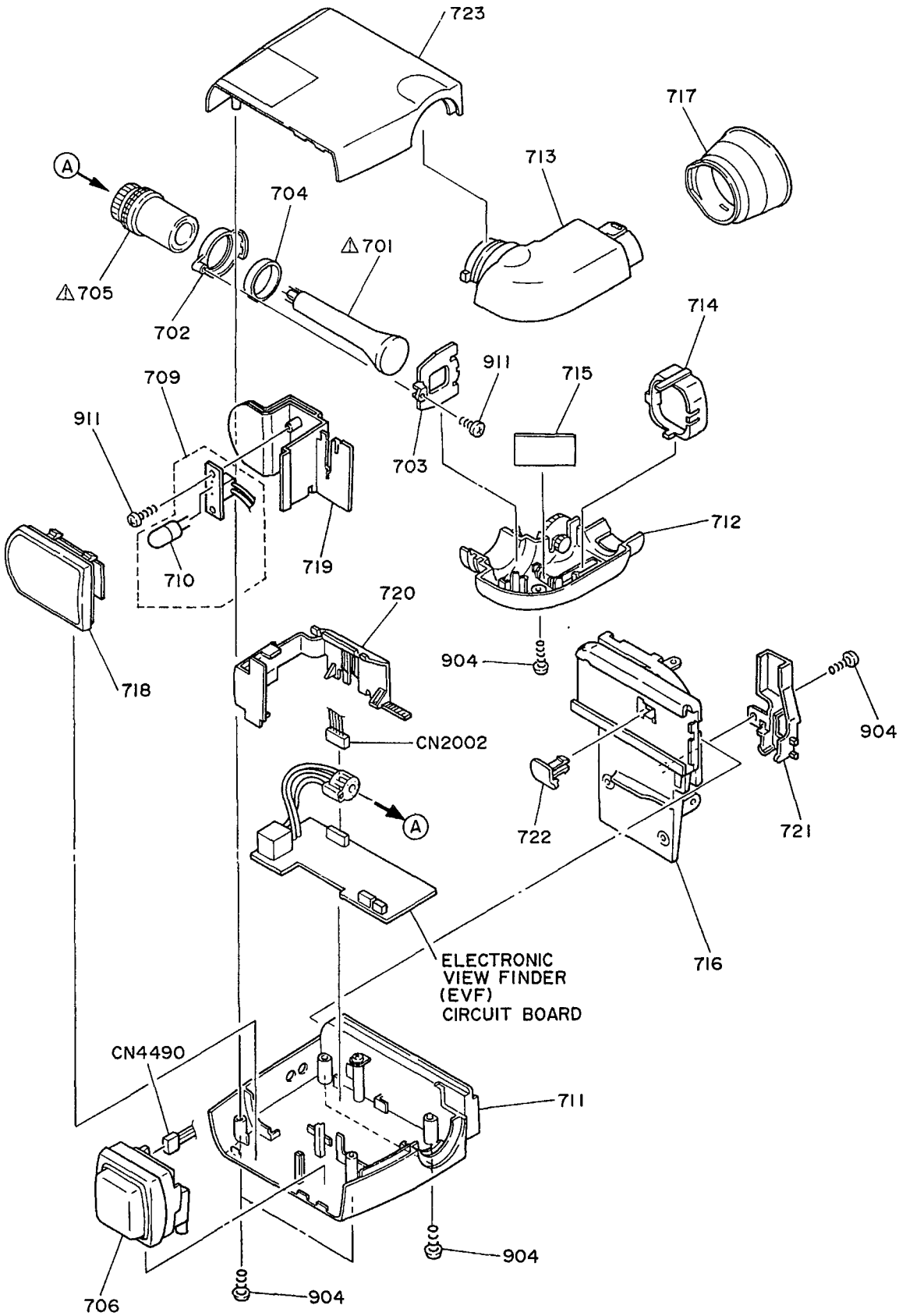
LUBRICATION

Lubrication points are shown in the exploded view diagrams by marks (Ⓕ , Ⓢ).
Lubrication shown in the diagrams are as follows.

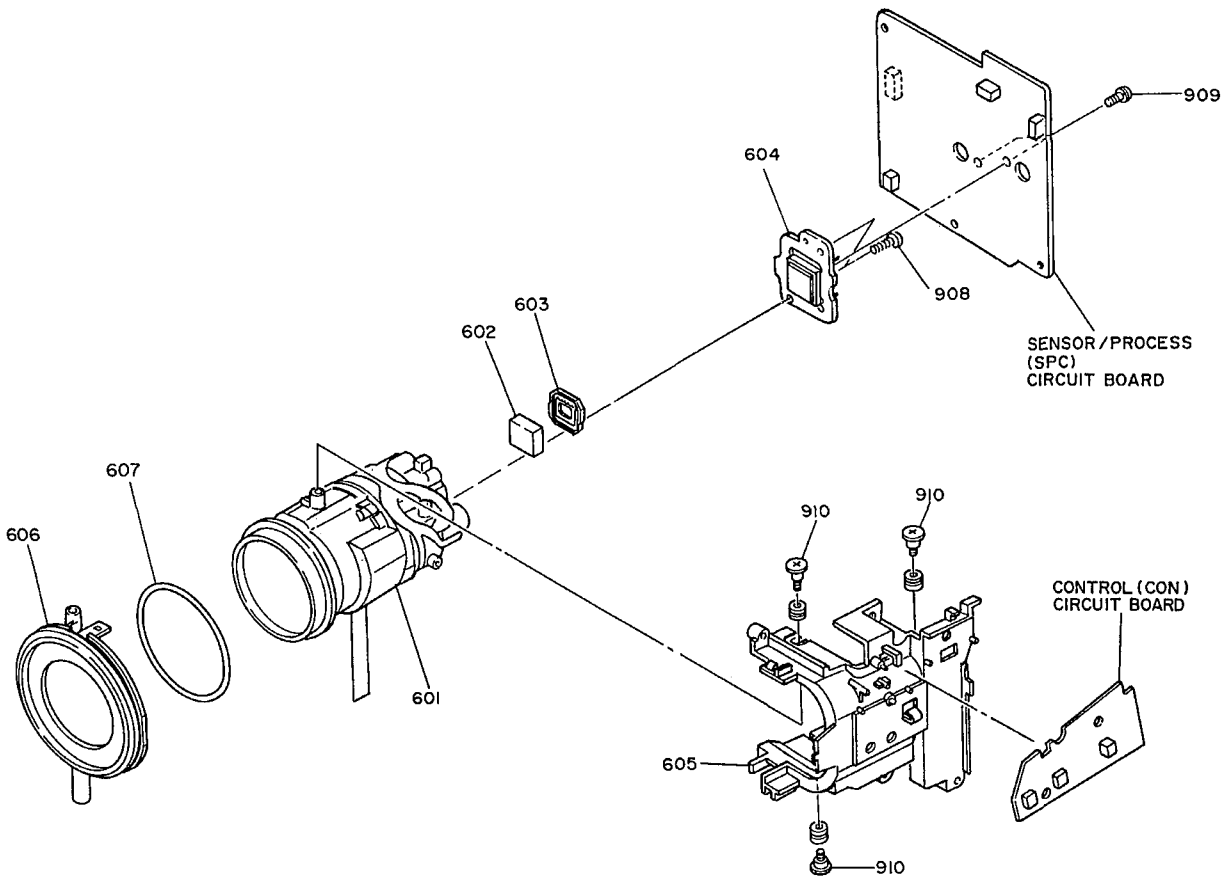
Ⓕ : Froil (G31-SAY)
Ⓢ : Sonic slider oil (#1600)



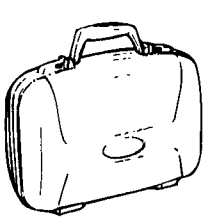
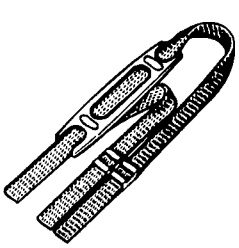
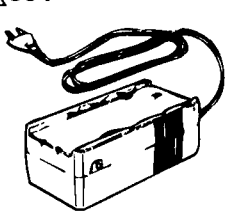
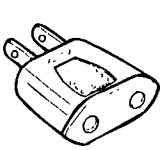
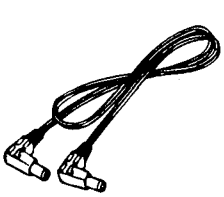
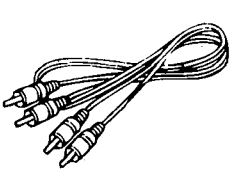
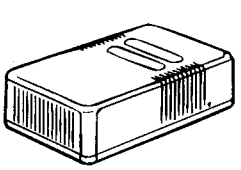
5. ELECTRONIC VIEWFINDER (EVF) SECTION



6. CAMERA SECTION



7. ACCESSORIES

802 	**803** 	**⚠804**  (VM-ACV23E)	**⚠ 808** 
810 	**811** 	**⚠ BATTERY** 	

CHAPTER 5 REPLACEMENT PARTS LIST

1. MECHANICAL PARTS LIST

SYMBOL NO	P-NO	DESCRIPTION
		MECHANISM SECTION
101	PH14894	LID, CASSETTE
102	QX12051	CAP, HOOD
103	QD13712	COVER, ADJUSTMENT
104	6409331	HINGE, CBA
105	QD14723	CASE, SIDE(R)
106	NT10521	PIECE, TRIPOD
107	QD14733	CASE, SIDE(L)
108	QX12751	STRAP, HAND
111	FH10241	SWITCH
112	PV10201	HANDLE ASSY
113	PC12162	KNOB, POWER
114	PC12241	SLIDE, POWER
115	PC12171	HOLDER, POWER KNOB
116	6305733	SPRING
117	PH13691	COVER, JACK
119	QX12036	TERMINAL
121	QX12001	HOLDER, HANDLE
122	7796453	SHOE, ACCESSARY
123	KL11081	SPRING, SHOU
130	QX11951	LEVER, LOCK
131	QD13602	HOLDER, PAD
132	QX11961	HOLDER, LEVER
133	PC12112	BUTTON, EJECT
202	KX12711	ARM, LOCK
203	6555792	SPRING
204	7469922	ARM, CAM
205	6440164	GEAR
206	6916112	GEAR, LOADING
208	6805682	ARM, OPERATION
209	KF10431	GEAR
210	GP10216	MOTOR, CAPSTAN
211	5610821	SWITCH
212	KX10993	LOADING BLOCK
213	KX14721	HOLDER
214	KK10111	BELT
215	KX15231	BASE, SLIDER
216	KH10133	TAKE UP REEL
217	7786623	POLYSLIDER WASHER
218	7778859	POLYSLIDER WASHER
219	6820551	BRAKE
221	6806322	BRAKE, SUB
222	6555814	SPRING
223	KX14651	GEAR, LOADING(I)
224	KX14681	GEAR, LOADING(O)
225	6916148	BASE, CYLINDER
229	6916343	BASE, GUIDE ROLLER(IN)
230	6424743	ROLLER, GUIDE
231	6916364	BASE, GUIDE ROLLER(OUT)
232	KX10241	PLATE
235	6555823	SPRING
236	6820992	BAND, TENTION
237	7472875	ARM, TENTION
238	KX14711	SLIDER
240	7469943	LINK, PRESSER ROLLER
241	7469909	ARM, PRESSURE ROLLER
242	6523243	SPRING
243	6551952	SPRING
244	NA11981	ARM, HEAD
245	6523253	SPRING
246	7785673	NUT
247	6911698	ARM
248	6551961	SPRING
249	6806257	PLATE
251	KX15291	GUIDE
253	KX10417	CASSETTE HOLDER ASSY
254	KH10114	REEL, SUPPLY
256	5443492	HEAD, AUDIO CONTROL
257	6550942	SPRING
261	GC10111	FE HEAD
262	4508238	GUIDE
274	6552494	SPRING
277	KX16791	CLAMP
280	KX10941	LOADING BLOCK
501	HX10472	CYLINDER ASSY (CY-V3SA)
601	KQ10521	LENS, ZOOM
602	DT10141	CRYSTAL
603	NX11252	RUBBER
604	UE12322	CCD IMAGE SENSOR ASSY
605	NT10791	FRAME, LENS
606	QX12651	HOOD
607	NX11243	RING, O
⚠700	UE12034	EVF ASSY
⚠701	5319051	CRT(M01KOM07WB)
702	6409361	CRT HOLDER
703	4731871	COVER CRT
704	6594361	RUBBER
⚠705	5242111	DEFLECTION YOKE
706	GH10111	MICROPHONE
709	DP10111	LAMP
710	DP10122	BULB
711	QD12368	CASE, BOTTOM(U)
712	4717952	NECK, BOTTOM
713	4717941	NECK UPPER
714	6952291	LENS ASSY
715	4895942	MIRROR
716	QD13521	COVER, FRONT
717	4799871	CAP EYE
718	4717982	COVER, LIGHT
719	NT10341	FRAME
720	6409374	HOLDER, CORD
721	NX13781	GUIDE, CORD
722	NJ10181	COVER, SHOE
723	4717891	CASE, UPPER
901	7784373	SCREW
902	8699308	SCREW (2.6X8) BLACK
903	7784785	SCREW
904	8699106	SCREW(2X6)
905	8652405	SCREW 3X5 WITH WASHER
906	MJ10301	SCREW
908	7775945	SCREW(2X5)
909	8650103	SCREW(2X3)
910	MJ10221	SCREW
911	8691106	SCREW (2X6)
913	8639106	SCREW(2X6)
951	8741106	SCREW(2X6)
952	8741408	SCREW (B3X8)
953	7782616	SCREW
954	6911101	SCREW
955	8741110	BIND SCREW-2MMDX 10MM
956	MJ10111	SCREW
957	7770831	SCREW
958	7784371	SCREW
959	8691106	SCREW (2X6)
961	8741104	SCREW(2X4)
963	MK11051	SCREW(2X5)
964	MJ10211	SCREW
965	7773911	WASHER

SYMBOL NO	P-NO	DESCRIPTION
966	8691108	SCREW(2X8)
		ACCESSARIES
802	TS12793	CASE,CARRING
803	PX10202	STRAP,SHOULDER
⚠804	TS12519	AC ADAPTOR (VM-ACV23E)
⚠808	5699421	SOCKT
810	EV10422	CORD,POWER
811	EW10944	CORD

SYMBOL NO	P-NO	DESCRIPTION

2. ELECTRICAL PARTS LIST

SYMBOL NO	P-NO	DESCRIPTION
		VCR SECTION
C0201	0893018	CERAMIC CHIP 0.022UF+-10% 25V
C0202	0893018	CERAMIC CHIP 0.022UF+-10% 25V
C0203	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0204	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0205	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0206	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0207	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0209	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0210	0209945	CERAMIC DISC 180PF+-5% 50V
C0211	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0212	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0213	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0214	0800227	ELECTROLYTIC 47UF 6.3V
C0215	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0216	0800217	ELECTROLYTIC 3.3UF 35V
C0217	0209944	CERAMIC CHIP 150PF+-5% 50V
C0218	0209925	CERAMIC DISC 5PF+-0.25%
C0219	0800218	ELECTROLYTIC 4.7UF 25V
C0220	0893021	CERAMIC CHIP 0.033UF+-10% 50V
C0221	0800218	ELECTROLYTIC 4.7UF 25V
C0222	0209937	CERAMIC CHIP 39PF+-5% 50V
C0224	0800214	ELECTROLYTIC 0.47UF 50V
C0225	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0227	0893021	CERAMIC CHIP 0.033UF+-10% 50V
C0228	0800219	ELECTROLYTIC 10UF 16V
C0229	0800227	ELECTROLYTIC 47UF 6.3V
C0230	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0231	0800221	ELECTROLYTIC 22UF 6.3V
C0232	0800218	ELECTROLYTIC 4.7UF 25V
C0233	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0234	0800219	ELECTROLYTIC 10UF 16V
C0235	0800219	ELECTROLYTIC 10UF 16V
C0236	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0237	AA00354R	CERAMIC CHIP 0.47UF+-10% 16V
C0238	0800217	ELECTROLYTIC 3.3UF 35V
C0239	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0240	0893018	CERAMIC CHIP 0.022UF+-10% 25V
C0241	0893004	CERAMIC CHIP 0.047UF+-10% 16V
C0242	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0243	0209930	CERAMIC CHIP 10PF+-0.5% 50V
C0244	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0245	0209944	CERAMIC CHIP 150PF+-5% 50V
C0247	0800219	ELECTROLYTIC 10UF 16V
C0251	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0253	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0254	0800218	ELECTROLYTIC 4.7UF 25V
C0255	0209949	CERAMIC DISC 390PF+-5% 50V
C0256	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0257	0800217	ELECTROLYTIC 3.3UF 35V
C0258	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0261	0800215	ELECTROLYTIC 1UF 50V
C0262	0209929	CERAMIC CHIP 9.0PF+-0.5% 50V
C0263	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0264	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0265	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0266	0893038	CERAMIC CHIP 3900PF+-10% 50V
C0267	0800234	ELECTROLYTIC 220UF 6.3V
C0268	0209942	CERAMIC CHIP 100PF+-5% 50V
C0270	0893038	CERAMIC CHIP 3900PF+-10% 50V
C0271	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0272	0893018	CERAMIC CHIP 0.022UF+-10% 25V
C0273	0209943	CERAMIC DISC 120PF+-5%
C0274	0209937	CERAMIC CHIP 39PF+-5% 50V
C0276	0209936	CERAMIC CHIP 33PF+-5% 50V
C0277	0209935	CERAMIC CHIP 27PF+-5% 50V
C0278	0207525	ELECTROLYTIC 1UF 50V
C0280	0800211	ELECTROLYTIC 0.1UF 50V
C0281	0893018	CERAMIC CHIP 0.022UF+-10% 25V
C0282	0893018	CERAMIC CHIP 0.022UF+-10% 25V
C0283	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0284	0800231	ELECTROLYTIC 100UF 6.3V
C0285	0800231	ELECTROLYTIC 100UF 6.3V
C0286	0800219	ELECTROLYTIC 10UF 16V
C0287	0800227	ELECTROLYTIC 47UF 6.3V
C0288	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0289	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0295	0800219	ELECTROLYTIC 10UF 16V
C0296	0893021	CERAMIC CHIP 0.033UF+-10% 50V
C0297	0209938	CERAMIC CHIP 47PF+-5% 50V
C0298	0893018	CERAMIC CHIP 0.022UF+-10% 25V
C0299	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0300	0209948	CERAMIC CHIP 330PF+-5% 50V
C0301	0209942	CERAMIC CHIP 100PF+-5% 50V
C0304	0209942	CERAMIC CHIP 100PF+-5% 50V
C0402	0800218	ELECTROLYTIC 4.7UF 25V
C0403	0893004	CERAMIC CHIP 0.047UF+-10% 16V
C0405	0800219	ELECTROLYTIC 10UF 16V
C0406	0893033	CERAMIC CHIP 1500PF+-10% 50V
C0408	0800219	ELECTROLYTIC 10UF 16V
C0409	0893016	CERAMIC CHIP 0.015UF+-10% 25V
C0410	0800219	ELECTROLYTIC 10UF 16V
C0411	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0412	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0413	0800215	ELECTROLYTIC 1UF 50V
C0415	0800218	ELECTROLYTIC 4.7UF 25V
C0416	0893018	CERAMIC CHIP 0.022UF+-10% 25V
C0417	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0418	0893018	CERAMIC CHIP 0.022UF+-10% 25V
C0422	0800217	ELECTROLYTIC 3.3UF 35V
C0424	0800234	ELECTROLYTIC 220UF 6.3V
C0425	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0426	0893021	CERAMIC CHIP 0.033UF+-10% 50V
C0427	0800234	ELECTROLYTIC 220UF 6.3V
C0428	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0429	0893041	CERAMIC CHIP 5600PF+-10% 50V
C0430	AF10115R	CHIP CAPASITOR 0.018UF+-5% 50V
C0431	0204273	POLYESTER FILM 6800PF+-5% 100V
C0432	0209946	CERAMIC CHIP 220PF+-5% 50V
C0438	0800211	ELECTROLYTIC 0.1UF 50V
C0439	0800211	ELECTROLYTIC 0.1UF 50V
C0440	0800213	ELECTROLYTIC 0.33UF 50V
C0441	0800221	ELECTROLYTIC 22UF 6.3V
C0442	0893067	CERAMIC CHIP 0.1UF+80-20% 25V
C0443	0800227	ELECTROLYTIC 47UF 6.3V
C0447	0800219	ELECTROLYTIC 10UF 16V
C0449	0800223	ELECTROLYTIC 22UF 16V
C0451	0800221	ELECTROLYTIC 22UF 6.3V
C0454	0800219	ELECTROLYTIC 10UF 16V
C0455	0893067	CERAMIC CHIP 0.1UF+80-20% 25V
C0456	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0501	0800217	ELECTROLYTIC 3.3UF 35V
C0502	0255883	ELECTROLYTIC 220UF 16V
C0503	0255883	ELECTROLYTIC 220UF 16V
C0504	0255883	ELECTROLYTIC 220UF 16V
C0505	0893018	CERAMIC CHIP 0.022UF+-10% 25V
C0506	0893067	CERAMIC CHIP 0.1UF+80-20% 25V
C0507	0255883	ELECTROLYTIC 220UF 16V

SYMBOL NO	P-NO	DESCRIPTION
C0508	0255883	ELECTROLYTIC 220UF 16V
C0509	0893062	CERAMIC CHIP 1UF+80-20% 16V
C0510	0893062	CERAMIC CHIP 1UF+80-20% 16V
C0511	0800236	ELECTROLYTIC 22UF 50V
C0512	0800236	ELECTROLYTIC 22UF 50V
C0513	0893018	CERAMIC CHIP 0.022UF+-10% 25V
C0517	0893067	CERAMIC CHIP 0.1UF+80-20% 25V
C0518	0893067	CERAMIC CHIP 0.1UF+80-20% 25V
C0519	0893033	CERAMIC CHIP 1500PF+-10% 50V
C0520	0800214	ELECTROLYTIC 0.47UF 50V
C0521	0893039	CERAMIC CHIP 4700PF+-10% 50V
C0522	0893039	CERAMIC CHIP 4700PF+-10% 50V
C0523	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0524	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0525	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0526	0893039	CERAMIC CHIP 4700PF+-10% 50V
C0527	0893067	CERAMIC CHIP 0.1UF+80-20% 25V
C0532	0893067	CERAMIC CHIP 0.1UF+80-20% 25V
C0534	0800229	ELECTROLYTIC 47UF 16V
C0536	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0537	0800234	ELECTROLYTIC 220UF 6.3V
C0538	0800234	ELECTROLYTIC 220UF 6.3V
C0606	0893018	CERAMIC CHIP 0.022UF+-10% 25V
C0608	0893021	CERAMIC CHIP 0.033UF+-10% 50V
C0609	0893013	CERAMIC CHIP 0.22UF+-10% 16V
C0614	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0615	0893027	CERAMIC CHIP 0.1UF+-10% 25V
C0616	0800219	ELECTROLYTIC 10UF 16V
C0617	0800221	ELECTROLYTIC 22UF 6.3V
C0618	0209949	CERAMIC DISC 390PF+-5% 50V
C0619	0893039	CERAMIC CHIP 4700PF+-10% 50V
C0621	0893067	CERAMIC CHIP 0.1UF+80-20% 25V
C0622	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0901	0893067	CERAMIC CHIP 0.1UF+80-20% 25V
C0903	0893062	CERAMIC CHIP 1UF+80-20% 16V
C0904	0800221	ELECTROLYTIC 22UF 6.3V
C0905	0800215	ELECTROLYTIC 1UF 50V
C0906	0893067	CERAMIC CHIP 0.1UF+80-20% 25V
C0907	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0908	0893062	CERAMIC CHIP 1UF+80-20% 16V
C0909	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0910	0893021	CERAMIC CHIP 0.033UF+-10% 50V
C0911	0893021	CERAMIC CHIP 0.033UF+-10% 50V
C0913	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0914	0893021	CERAMIC CHIP 0.033UF+-10% 50V
C0916	0893062	CERAMIC CHIP 1UF+80-20% 16V
C0917	0893062	CERAMIC CHIP 1UF+80-20% 16V
C0918	0893062	CERAMIC CHIP 1UF+80-20% 16V
C0919	0209933	CERAMIC CHIP 18PF+-5% 50V
C0920	0209934	CERAMIC CHIP 22PF+-5% 50V
C0921	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0923	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0924	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0925	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0926	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0929	0893067	CERAMIC CHIP 0.1UF+80-20% 25V
C0930	0893062	CERAMIC CHIP 1UF+80-20% 16V
C0931	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0933	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0934	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0935	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0936	0209936	CERAMIC CHIP 33PF+-5% 50V
C0937	0209936	CERAMIC CHIP 33PF+-5% 50V
C0939	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0943	0893067	CERAMIC CHIP 0.1UF+80-20% 25V

SYMBOL NO	P-NO	DESCRIPTION
C0944	0800234	ELECTROLYTIC 220UF 6.3V
C0945	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C0946	0209942	CERAMIC CHIP 100PF+-5% 50V
C0947	0800215	ELECTROLYTIC 1UF 50V
C0949	0893035	CERAMIC CHIP 2200PF+-10% 50V
C0950	0800215	ELECTROLYTIC 1UF 50V
C0951	0209934	CERAMIC CHIP 22PF+-5% 50V
C0952	0209935	CERAMIC CHIP 27PF+-5% 50V
R0205	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R0207	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R0211	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R0212	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0213	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0214	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0217	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R0218	0103834	CHIP RESISTOR 180OHM+-5% 0.1W
R0219	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R0220	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R0221	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R0222	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R0228	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R0229	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0230	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R0233	0103865	CHIP RESISTOR 68KOHM+-5% 0.1W
R0234	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R0235	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R0236	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R0237	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R0238	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R0239	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R0242	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0243	0103836	CHIP RESISTOR 270 OHM+-5% 0.1W
R0244	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R0245	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0246	0104267	CHIP RESISTOR 75 OHM+-1% 1/10W
R0247	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0249	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0250	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R0251	0104267	CHIP RESISTOR 75 OHM+-1% 1/10W
R0253	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0254	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0257	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R0259	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R0260	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0261	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0262	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R0264	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R0265	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R0266	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0267	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R0269	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R0273	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R0274	0103833	CHIP RESISTOR 150 OHM+-5% 0.1W
R0276	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0278	0103881	CHIP RESISTOR 2.2MOHM+-10% 0.1W
R0402	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R0403	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R0404	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R0405	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R0406	0103819	CHIP RESISTOR 10 OHM+-5% 0.1W
R0407	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R0408	0103832	CHIP RESISTOR 120OHM+-5% 0.1W
R0409	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R0410	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0411	0103869	CHIP RESISTOR 150KOHM+-5% 0.1W

SYMBOL NO	P-NO	DESCRIPTION
R0412	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0413	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0414	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0415	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R0416	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R0417	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R0418	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R0420	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0421	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R0422	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R0423	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R0425	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R0428	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0429	0103839	CHIP RESISTOR 4700HM+-5% 0.1W
R0430	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R0434	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R0436	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R0440	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0443	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0448	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R0449	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R0450	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R0451	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0453	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R0454	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R0458	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0459	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R0460	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R0462	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R0463	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R0464	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R0465	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R0466	0103875	CHIP RESISTOR 470KOHM+-5% 0.1W
R0469	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0503	0103827	CHIP RESISTOR 47 OHM+-5% 0.1W
R0504	0104304	CHIP RESISTOR 22KOHM+-0.5% 1/16W
R0505	0103832	CHIP RESISTOR 1200HM+-5% 0.1W
R0506	0105121	CHIP RESISTOR 390 OHM+-1% 1/10W
R0507	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R0508	0103818	CHIP RESISTOR 8.20HM+-10% 0.1W
R0509	0103834	CHIP RESISTOR 1800HM+-5% 0.1W
R0511	0103827	CHIP RESISTOR 47 OHM+-5% 0.1W
R0513	0105146	CHIP RESISTOR 75KOHM+-1% 1/10W
R0515	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R0517	0104305	CHIP RESISTOR 6.8KOHM+-0.5% 1/16W
R0518	0104305	CHIP RESISTOR 6.8KOHM+-0.5% 1/16W
R0520	0104305	CHIP RESISTOR 6.8KOHM+-0.5% 1/16W
R0521	0104305	CHIP RESISTOR 6.8KOHM+-0.5% 1/16W
R0522	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R0524	AQ00046R	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R0525	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0526	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R0527	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R0528	0103827	CHIP RESISTOR 47 OHM+-5% 0.1W
R0529	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R0530	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R0531	0103826	CHIP RESISTOR 39 OHM+-5% 0.1W
R0534	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R0535	0104305	CHIP RESISTOR 6.8KOHM+-0.5% 1/16W
R0536	0104305	CHIP RESISTOR 6.8KOHM+-0.5% 1/16W
R0537	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R0538	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0540	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R0541	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R0543	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W

SYMBOL NO	P-NO	DESCRIPTION
R0605	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0606	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0611	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0612	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0625	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R0627	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R0628	0103833	CHIP RESISTOR 150 OHM+-5% 0.1W
R0629	0103833	CHIP RESISTOR 150 OHM+-5% 0.1W
R0630	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0632	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0634	0103865	CHIP RESISTOR 68KOHM+-5% 0.1W
R0636	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0831	0105573	CHIP RESISTOR 130KOHM+-1% 1/10W
R0832	0103875	CHIP RESISTOR 470KOHM+-5% 0.1W
R0833	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0836	0103875	CHIP RESISTOR 470KOHM+-5% 0.1W
R0901	0104111	CHIP RESISTOR 10KOHM+-1% 1/10W
R0902	0104262	CHIP RESISTOR 6.8KOHM+-1% 0.1W
R0903	0104111	CHIP RESISTOR 10KOHM+-1% 1/10W
R0904	0104121	CHIP RESISTOR 27KOHM+-1% 1/10W
R0905	0103834	CHIP RESISTOR 1800HM+-5% 0.1W
R0906	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0907	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R0908	AQ00064R	CHIP RESISTOR 100KOHM+-5% 1/16W
R0909	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0910	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R0912	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R0913	AQ00077R	CHIP RESISTOR 1MOHM+-5% 1/16W
R0914	0103876	CHIP RESISTOR 560KOHM+-5% 0.1W
R0915	AQ00077R	CHIP RESISTOR 1MOHM+-5% 1/16W
R0921	AQ00042R	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R0925	AQ00046R	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R0926	AQ00046R	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R0933	AQ00046R	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R0934	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R0936	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R0939	0103830	CHIP RESISTOR 820HM+-5% 0.1W
R0940	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0942	0104262	CHIP RESISTOR 6.8KOHM+-1% 0.1W
R0943	0104111	CHIP RESISTOR 10KOHM+-1% 1/10W
R0944	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0945	0104111	CHIP RESISTOR 10KOHM+-1% 1/10W
R0946	AQ00042R	CHIP RESISTOR 2.2KOHM+-5% 1/16W
R0947	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0948	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0949	0103839	CHIP RESISTOR 4700HM+-5% 0.1W
R0950	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R0951	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R0952	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R0953	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R0955	AQ00024R	CHIP RESISTOR 100 OHM+-5% 1/16W
R0960	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0961	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0962	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R0963	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R0964	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R0965	0104242	METAL FILM 4.3KOHM+-5% 1/10W
R0966	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R0967	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0968	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R0969	0103839	CHIP RESISTOR 4700HM+-5% 0.1W
R0970	0103839	CHIP RESISTOR 4700HM+-5% 0.1W
R0971	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R0972	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R0973	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W

SYMBOL NO	P-NO	DESCRIPTION
R0975	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0976	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R0977	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R0978	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R0979	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0980	0103862	CHIP RESISTOR 39KOHM+-5% 0.1W
R0981	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R0982	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0983	0104126	CHIP RESISTOR 680KOHM+-1% 1/10W
R0984	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0985	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0986	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0988	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R0989	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0990	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R0991	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R0992	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0993	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0994	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R0996	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R0998	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
RT0601	AW10212R	SEMI VARIABLE 220KOHM
D0001	5380931	LED GL450
D0201	5328306	DIODE MA152WA
D0202	5328306	DIODE MA152WA
D0203	5328306	DIODE MA152WA
D0204	5337211	DIODE DAN217
D0207	5328306	DIODE MA152WA
D0401	CC10291R	DIODE 1SS353
D0403	CC10291R	DIODE 1SS353
D0405	5337211	DIODE DAN217
D0408	5337211	DIODE DAN217
D0410	5337211	DIODE DAN217
D0501	5337372	DIODE SB07-03C
D0502	CC10291R	DIODE 1SS353
D0504	CC10291R	DIODE 1SS353
D0505	5337062	DIODE MA122
D0901	5337372	DIODE SB07-03C
D0902	CC10291R	DIODE 1SS353
D0903	5337062	DIODE MA122
D0904	CC10291R	DIODE 1SS353
D0906	5337211	DIODE DAN217
D0907	5328306	DIODE MA152WA
D0908	5328306	DIODE MA152WA
IC0201	CK14411	IC HA118203F
IC0202	CK13931R	IC STV5727
IC0203	CK13471R	IC UPC5023GS-104-E1
IC0204	CK13573R	IC MSM7470-71MS-KR1
IC0501	CK10541	IC BA9706K
IC0502	1308011	TRANSISTOR MPL1
IC0901	CK14264U	IC HD6433974SB53F
IC0902	1352582	IC S-84206F
IC0903	CK18302R	IC SN74AHCT125PW
IC0904	1366651	IC BA6417F
IC0905	1352512	IC BA7046F
Q0001	5324661	PHOTO TRANSISTOR PT-483F1H
Q0002	5333952	IC ON2170LH
Q0003	5324661	PHOTO TRANSISTOR PT-483F1H
Q0004	5333391	IC NJL5161K
Q0201	5326712	TRANSISTOR IMB10
Q0202	CA10731R	TRANSISTOR DTC124K
Q0203	CA10583R	TRANSISTOR 2SB709A
Q0204	CA10583R	TRANSISTOR 2SB709A
Q0205	CA10731R	TRANSISTOR DTC124K
Q0206	5326705	TRANSISTOR IMZ2

SYMBOL NO	P-NO	DESCRIPTION
Q0208	5326256	TRANSISTOR DTC343TK
Q0211	CA10731R	TRANSISTOR DTC124K
Q0212	CA10731R	TRANSISTOR DTC124K
Q0213	CA10744R	TRANSISTOR FMG1
Q0219	CA10583R	TRANSISTOR 2SB709A
Q0401	CA10732R	TRANSISTOR DTA124K
Q0402	5326694	TRANSISTOR FMW3
Q0403	CA10731R	TRANSISTOR DTC124K
Q0404	5326705	TRANSISTOR IMZ2
Q0405	1323142	TRANSISTOR 2SC2411K
Q0406	1323142	TRANSISTOR 2SC2411K
Q0407	5326491	TRNSISTOR IMX1
Q0415	5326705	TRANSISTOR IMZ2
Q0416	5326491	TRNSISTOR IMX1
Q0419	5326491	TRNSISTOR IMX1
Q0423	CA10731R	TRANSISTOR DTC124K
Q0501	CA10271R	TRANSISTOR 2SB1424
Q0502	CA10746R	TRANSISTOR FMC2
Q0503	CA10711R	TRANSISTOR 2SC5053
Q0504	1323142	TRANSISTOR 2SC2411K
Q0507	5326705	TRANSISTOR IMZ2
Q0508	CA10271R	TRANSISTOR 2SB1424
Q0509	CA10731R	TRANSISTOR DTC124K
Q0511	5326502	TRANSISTOR 2SD1766 (R)
Q0901	5326491	TRNSISTOR IMX1
Q0902	5326705	TRANSISTOR IMZ2
Q0903	5326491	TRNSISTOR IMX1
Q0904	CA10731R	TRANSISTOR DTC124K
Q0905	CA10583R	TRANSISTOR 2SB709A
Q0906	CA10731R	TRANSISTOR DTC124K
Q0907	5326705	TRANSISTOR IMZ2
ZD0201	CC10458R	DIODE MA3075L
ZD0202	CC10458R	DIODE MA3075L
ZD0401	CC10458R	DIODE MA3075L
ZD0501	CC10463R	DIODE MA3100L
ZD0901	CC10454R	DIODE MA3068L
T0201	BM10171R	FILTER,MODE
T0401	BS10211	TRANSFORMER
T0402	BS10201	TRANSFORMER
T0502	BV10201R	CHOKE COIL
T0503	BC10121R	TRANSFORMER
L0201	0770028	COIL 220UH+-5%
L0202	5121582	COIL 100UH
L0203	0770012	COIL 12UH
L0204	5121582	COIL 100UH
L0205	0770008	COIL 6.8UH
L0206	5121582	COIL 100UH
L0207	5121582	COIL 100UH
L0208	0770022	COIL 68UH+-5%
L0210	0770028	COIL 220UH+-5%
L0211	5121582	COIL 100UH
L0213	BA10308R	COIL 15UH
L0214	5121582	COIL 100UH
L0216	0770028	COIL 220UH+-5%
L0218	0770022	COIL 68UH+-5%
L0220	0770107	COIL,CHOKE 100UH+-5%
L0403	0770107	COIL,CHOKE 100UH+-5%
L0404	0770107	COIL,CHOKE 100UH+-5%
L0501	BH10111R	COIL 22UH
L0502	BH10116R	COIL 100UH
L0503	BH10115R	COIL 100UH
L0504	BH10116R	COIL 100UH
L0505	0770103	COIL,CHOKE 47UH+-5%
L0506	0770103	COIL,CHOKE 47UH+-5%
L0508	0770101	CHOKE COIL 33UH

SYMBOL NO	P-NO	DESCRIPTION
L0510	0770098	COIL, CHOKE 22UH+-5%
L0511	0770099	COIL, CHOKE 27UH+-5%
L0902	0770013	COIL 15UH+-5%
L0903	0770112	COIL, CHOKE 220UH+-5%
CX0201	BP10541G	CRYSTAL
CX0901	BP10501	CRYSTAL
CX0902	BL10311R	CRYSTAL
CN0201	5847073	CONNECTOR
CN0402	5846287	CONNECTOR
CN0403	EF10365	CONNECTOR
CN0601	EK10725	CONNECTOR
CN0602	5886211	MINI CONNECTOR
CN0902	EF10173	CONNECTOR
CN0903	EF10172	CONNECTOR
CN0905	EF10552	CONNECTOR
CN0909	5815711	CONNECTOR
CN0912	5842026	MINI CONNECTOR
CN4490	5887042	CONNECTOR
⚠F0501	5723232	FUSE 2A
JK0401	ES10111	AV JACK
JK0501	5693501	JACK, DC
JK0901	EY10161	JACK
⚠LI0901	5761771	BATTERY, BACK UP
PG0201	EA10652R	CONNECTOR
PG0401	5661688	MINI PLUG
PG0402	5666146	MINI PLUG
PG0403	5666561	MINI PLUG
PG0601	ED10773	PLUG
PG0602	5666567	MINI PLUG
PG0603	5666168	MINI PLUG
PG0901	ED10949	CONNECTOR
PG0902	5666434	PLUG
PG0903	5666433	PLUG
PG0905	5666185	MINI PLUG
PG0908	5668948	PLUG
PG0909	5666561	MINI PLUG
PG0911	5666431	PLUG
PG0912	5666198	MINI PLUG
S0001	5601822	SWITCH
S0002	5635331	SWITCH
S0401	5610911	SWITCH
S0901	5621951	SWITCH
S0902	FE10211R	SWITCH
S0903	FE10211R	SWITCH
S0904	FE10211R	SWITCH
S0905	FE10211R	SWITCH
S0906	FE10211R	SWITCH
S0907	5634862	SWITCH
S0908	FE10211R	SWITCH
S0909	FE10211R	SWITCH
S0910	FE10211R	SWITCH
S0911	FE10211R	SWITCH
S0912	5635133	SWITCH
S0913	5621702	SWITCH

CAMERA SECTION

C1001	0893188	CERAMIC CHIP 0.047UF+-10% 16V
C1002	0806169	ELECTROLYTIC 47UF 16V
C1003	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1004	0893227	CERAMIC CHIP 0.22UF+80-20% 16V
C1005	0806163	ELECTROLYTIC 33UF 10V
C1006	0893188	CERAMIC CHIP 0.047UF+-10% 16V
C1008	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1009	0893208	CERAMIC CHIP 1000PF+-10% 50V
C1101	0893117	CERAMIC CHIP 22PF+-5% 50V
C1102	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C1103	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C1104	0806019	ELECTROLYTIC 2.2UF 10V
C1106	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1107	0806168	ELECTROLYTIC 47UF 6.3V
C1108	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1109	0806169	ELECTROLYTIC 47UF 16V
C1110	0893188	CERAMIC CHIP 0.047UF+-10% 16V
C1111	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1113	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1114	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1116	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1117	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1118	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1119	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1120	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1121	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1122	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1123	0893109	CERAMIC CHIP 7.0PF +-0.5% 50V
C1124	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1125	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1126	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1127	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1128	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1129	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1130	0893121	CERAMIC CHIP 39PF+-5% 50V
C1131	0893121	CERAMIC CHIP 39PF+-5% 50V
C1133	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1134	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1135	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1136	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1137	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1138	0893114	CERAMIC CHIP 12PF+-5% 50V
C1139	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1141	0806169	ELECTROLYTIC 47UF 16V
C1142	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1143	0806168	ELECTROLYTIC 47UF 6.3V
C1144	0202319	CERAMIC CHIP 22PF+-2% 50V
C1145	0893124	CHIP CERAMIC 68PF+-5% 50V
C1146	0893125	CERAMIC CHIP 82PF+-5% 50V
C1147	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1148	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1149	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1150	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1151	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1152	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1153	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C1154	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1155	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1156	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1158	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1159	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1160	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1161	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1162	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1163	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1166	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1167	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1168	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1169	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1170	0893239	CERAMIC CHIP 0.01UF+80-20% 50V
C1173	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1174	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1185	0893193	CERAMIC CHIP 0.01UF+-10% 25V

SYMBOL NO	P-NO	DESCRIPTION
C1201	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1202	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1203	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1204	0893132	CERAMIC CHIP 270PF+-5% 50V
C1205	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1206	0893007	CERAMIC CHIP 0.082UF+-10% 16V
C1207	0893013	CERAMIC CHIP 0.22UF+-10% 16V
C1208	0893113	CERAMIC CHIP 10PF+-0.5% 50V
C1209	0893133	CERAMIC CHIP 330PF+-5% 50V
C1210	0893133	CERAMIC CHIP 330PF+-5% 50V
C1211	0893133	CERAMIC CHIP 330PF+-5% 50V
C1212	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1301	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1302	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1303	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1304	0893225	CERAMIC CHIP 0.1UF+80-20% 16V
C1305	0893193	CERAMIC CHIP 0.01UF+-10% 25V
C1311	0806168	ELECTROLYTIC 47UF 6.3V
C1705	0893193	CERAMIC CHIP 0.01UF+-10% 25V
R1001	0790044	CHIP RESISTOR 3.3KOHM+-5% 1/16W
R1002	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R1003	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1004	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1011	0790024	CHIP RESISTOR 100 OHM+-5% 1/16W
R1012	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1102	0790068	CHIP RESISTOR 220KOHM+-5% 1/16W
R1103	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1104	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1105	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R1106	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R1107	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1108	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1109	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R1110	0790033	CHIP RESISTOR 470 OHM+-5% 1/16W
R1113	0790019	CHIP RESISTOR 47 OHM+-5% 1/16W
R1114	0104571	CHIP RESISTOR 3.9KOHM+-1% 1/16W
R1115	0105675	CHIP RESISTOR 100KOHM+-1% 1/16W
R1116	0790038	CHIP RESISTOR 1.2KOHM+-5% 1/16W
R1117	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R1118	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R1120	0104545	CHIP RESISTOR 1.24KOHM+-1% 1/16W
R1121	0104558	CHIP RESISTOR 5.6KOHM+-1% 1/16W
R1122	0104563	CHIP RESISTOR 47KOHM+-1% 1/16W
R1123	0104554	CHIP RESISTOR 1KOHM+-1% 1/16W
R1124	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1125	0104559	CHIP RESISTOR 4.7KOHM+-1% 1/16W
R1126	0104533	CHIP RESISTOR 1.5KOHM+-15 1/16W
R1130	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1131	0790034	CHIP RESISTOR 560 OHM+-5% 1/16W
R1132	0104518	CHIP RESISTOR 2.87KOHM+-1% 1/16W
R1133	0104552	CHIP RESISTOR 6.8KOHM+-1% 1/16W
R1135	0790038	CHIP RESISTOR 1.2KOHM+-5% 1/16W
R1139	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R1140	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R1141	0790057	CHIP RESISTOR 33KOHM+-5% 1/16W
R1142	0790034	CHIP RESISTOR 560 OHM+-5% 1/16W
R1143	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R1148	0790055	CHIP RESISTOR 22KOHM+-5% 1/16W
R1149	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1150	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1151	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W
R1152	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1171	0790038	CHIP RESISTOR 1.2KOHM+-5% 1/16W
R1172	0790059	CHIP RESISTOR 47KOHM+-5% 1/16W
R1188	0790037	CHIP RESISTOR 1KOHM+-5% 1/16W

SYMBOL NO	P-NO	DESCRIPTION
R1194	0790047	CHIP RESISTOR 5.6KOHM+-5% 1/16W
R1201	0790039	CHIP RESISTOR 1.5KOHM+-5% 1/16W
R1202	0790069	CHIP RESISTOR 0.27MOHM+-5% 1/16W
R1203	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R1204	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1205	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1206	0790077	CHIP RESISTOR 1MOHM+-5% 1/16W
R1207	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1208	0790071	CHIP RESISTOR 330KOHM+-5% 1/16W
R1209	0790068	CHIP RESISTOR 220KOHM+-5% 1/16W
R1210	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R1211	0790071	CHIP RESISTOR 330KOHM+-5% 1/16W
R1212	0790068	CHIP RESISTOR 220KOHM+-5% 1/16W
R1213	0790053	CHIP RESISTOR 15KOHM+-5% 1/16W
R1214	0790052	CHIP RESISTOR 12KOHM+-5% 1/16W
R1215	0790052	CHIP RESISTOR 12KOHM+-5% 1/16W
R1216	0790052	CHIP RESISTOR 12KOHM+-5% 1/16W
R1217	0790052	CHIP RESISTOR 12KOHM+-5% 1/16W
R1218	0790064	CHIP RESISTOR 100KOHM+-5% 1/16W
R1219	0790031	CHIP RESISTOR 330 OHM+-5% 1/16W
R1221	0790046	CHIP RESISTOR 4.7KOHM+-5% 1/16W
R1222	0790032	CHIP RESISTOR 390 OHM+-5% 1/16W
R1224	0790049	CHIP RESISTOR 8.2KOHM+-5% 1/16W
R1225	0790039	CHIP RESISTOR 1.5KOHM+-5% 1/16W
R1226	0790051	CHIP RESISTOR 10KOHM+-5% 1/16W
R1301	0790032	CHIP RESISTOR 390 OHM+-5% 1/16W
R1302	0790032	CHIP RESISTOR 390 OHM+-5% 1/16W
R1303	0790032	CHIP RESISTOR 390 OHM+-5% 1/16W
R1304	0790032	CHIP RESISTOR 390 OHM+-5% 1/16W
R1322	0790061	CHIP RESISTOR 56KOHM+-5% 1/16W
R1323	0790061	CHIP RESISTOR 56KOHM+-5% 1/16W
R1330	0104579	CHIP RESISTOR 12KOHM+-1% 1/16W
R1701	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R1702	0103866	CHIP RESISTOR 82KOHM+-5% 0.1W
R1703	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R1704	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R1711	0790043	CHIP RESISTOR 2.7KOHM+-5% 1/16W
R1801	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1802	0790028	CHIP RESISTOR 220 OHM+-5% 1/16W
R1813	0790043	CHIP RESISTOR 2.7KOHM+-5% 1/16W
R1814	0790043	CHIP RESISTOR 2.7KOHM+-5% 1/16W
D1001	5337351	DIODE MA132WK
D1101	5337372	DIODE SB07-03C
D1103	5337422	DIODE DA221
D1104	5337352	DIODE MA132WA
D1303	5337422	DIODE DA221
IC1001	UE12322	CCD IMAGE SENSOR ASSY
IC1101	1366681	IC HA118184F
IC1102	1365392	IC HD49319AF
IC1103	CK12132U	IC HG51CS035TEA
IC1104	CK12061R	IC UPD16510GR
IC1106	CK16512U	IC HD6433042ST31F
IC1107	CK14171R	IC MX25S67MR
IC1201	CK13791R	IC UPC5023GS-105-E1
IC1301	CK17991R	IC UPD16833G3
Q1001	5328221	TRANSISTOR 2SC2620-QC
Q1101	CA10583R	TRANSISTOR 2SB709A
Q1103	5328192	TRANSISTOR 2SC2462LD
Q1105	1323231	TRANSISTOR 2SB1462
Q1106	CA10583R	TRANSISTOR 2SB709A
Q1112	1323231	TRANSISTOR 2SB1462
Q1201	1323321	TRANSISTOR 2SD2216
Q1202	1323142	TRANSISTOR 2SC2411K
Q1203	1323142	TRANSISTOR 2SC2411K
L1101	BA10334R	COIL 10UH

SYMBOL NO	P-NO	DESCRIPTION
L1102	BA10334R	COIL 10UH
L1103	BA10334R	COIL 10UH
L1106	BA10337R	COIL 100UH
L1109	BA10334R	COIL 10UH
L1110	BA10334R	COIL 10UH
L1116	BA10334R	COIL 10UH
L1117	BA10334R	COIL 10UH
L1701	BA10334R	COIL 10UH
X1101	1930093	CRYSTAL
BL1101	5172403	FILTER
BL1102	5172403	FILTER
BL1811	5172541	FILTER
BL1812	5172541	FILTER
CN1015	1880368	CONNECTOR
CN1019	5845865	CONNECTOR
CP1101	BE10411R	FILTER,LOW PASS
PG1015	EA11041R	CONNECTOR
PG1017	5669167	MINI PLUG
PG1018	5669153	PLUG
PG1019	5669032	MINI PLUG
PG1301	EA10377R	PLUG
PG1701	5668955	PLUG
S1701	5636151	SWITCH
S1702	5636151	SWITCH
S1703	5636151	SWITCH
S1704	FE10211R	SWITCH
		B/W EVF[EMO]SECTION
C2001	0800227	ELECTROLYTIC 47UF 6.3V
C2002	0800259	ELECTROLYTIC 47UF 6.3V
C2004	0204331	CAPACITOR 3900PF+-5% 100V
C2005	0207709	CAPACITOR 47UF+-20% 35V
C2006	AJ10133R	CERAMIC CAPACITOR 1000PF+-10% 1KV
C2007	AJ10132R	CERAMIC CAPACITOR 1000PF+-10% 500V
C2008	0800216	ELECTROLYTIC 2.2UF 50V
C2009	0893086	CERAMIC CHIP 0.1UF+80-20% 50V
C2011	0209898	CERAMIC CHIP 100PF+-5% 50V
C2012	0893086	CERAMIC CHIP 0.1UF+80-20% 50V
C2013	0893086	CERAMIC CHIP 0.1UF+80-20% 50V
C2014	0880194	CAPACITOR 0.1UF+-5% 50V
C2015	0202303	CERAMIC CHIP 2200PF 50V
C2016	0893014	CERAMIC CHIP 0.01UF+-10% 25V
C2017	0800245	ELECTROLYTIC 1UF 50V
C2019	0893086	CERAMIC CHIP 0.1UF+80-20% 50V
R2001	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R2002	0103869	CHIP RESISTOR 150KOHM+-5% 0.1W
R2004	0103997	CHIP RESISTOR 1.5MOHM+-5% 1/8W
R2006	0103819	CHIP RESISTOR 10 OHM+-5% 0.1W
R2007	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R2008	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R2011	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2012	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R2013	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2014	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R2015	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R2016	0103814	CHIP RESISTOR 3.9 OHM+-10% 0.1W
R2018	0104269	CHIP RESISTOR 43KOHM+-1% 1/10W
R2019	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R2020	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2024	0103973	CHIP RESISTOR 2.2MOHM+-5% 1/8W
R2026	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2027	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2029	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2030	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2037	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
RT2001	5035204	SEMI VARIABLE 2.2MOHM
RT2002	5030251	SEMI VARIABLE 1MOHM
RT2003	5040103	SEMI VARIABLE 470 OHM
D2001	CC10291R	DIODE 1SS353
D2002	5337321	DIODE MA199
IC2001	1351632	IC HA118121FP
Q2001	CF10361R	TRANSISTOR 2SD974
Q2002	5328241	TRANSISTOR 2SC2463E(DE)
⚠T2001	5240565	TRANSFORMER,FLYBACK
L2001	0770107	COIL,CHOKE 100UH+-5%
L2002	5244018	COIL 210UH
CN2002	EF10903	CONNECTOR
⚠CS2001	5887004	CONNECTOR
PG2001	5661688	MINI PLUG
PG2002	5668948	PLUG
PG2003	5661686	MINI PLUG

CHAPTER 6 SCHEMATIC AND CIRCUIT BOARD DIAGRAMS/ MICROPROCESSOR PIN FUNCTION TABLE

Cautions when using schematic diagrams

Caution for safety

The parts marked ⚠ are critical for safety. Be sure to use the specified parts to ensure safety when replacing them.

1. Values in schematic diagrams

The values, dielectric strength (power capacitance) and tolerances of the resistors (excluding variable resistors) and capacitors are indicated in the schematic diagrams using abbreviations.

〔Resistors〕

Item	Indication
Value	No indication ····· Ω K ····· kΩ M ····· MΩ
Tolerance	No indication ····· ± 5% (All tolerances other than ± 5% are indicated in the schematic diagrams)
Power capacitance	No indication ····· 1/8W (1/16W for leadless resistors without indication) All apacitances other than the above are indicated in the schematic diagrams.

〔Capacitors〕

Item	Indication
Value	No indication ····· μF P ····· pF
Dielectric strength	No indication ····· 50V (All dielectric strengths other than 50V are indicated in the schematic diagrams.)

〔Coils〕

Item	Indication
Value	μ ····· μH m ····· mH

2. Markings in schematic diagrams

1) Parts marked " ■ " with circuit numbers in the schematic diagrams are discrete parts.
2) Parts marked " ● " with circuit numbers in the schematic diagrams are leadless parts.

Cautions when using circuit board diagrams

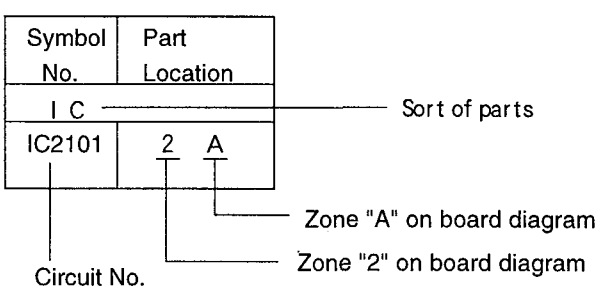
1. Identifications of sides A/B in circuit board diagrams

1) Board having a pattern on one side and parts on both sides.
   Side A: Shows discrete parts, viewed from the pattern side.
   Side B: Shows leadless parts, viewed from the pattern side.
2) Board having patterns on both sides and parts on both sides.
   Side A: Shows parts and patterns which can be seen when the case is opened.
   Side B: Shows parts and the pattern on the back of side A.

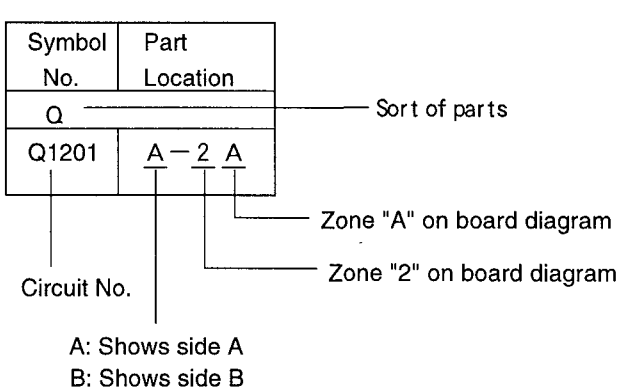
2. Table for indexing locations of parts

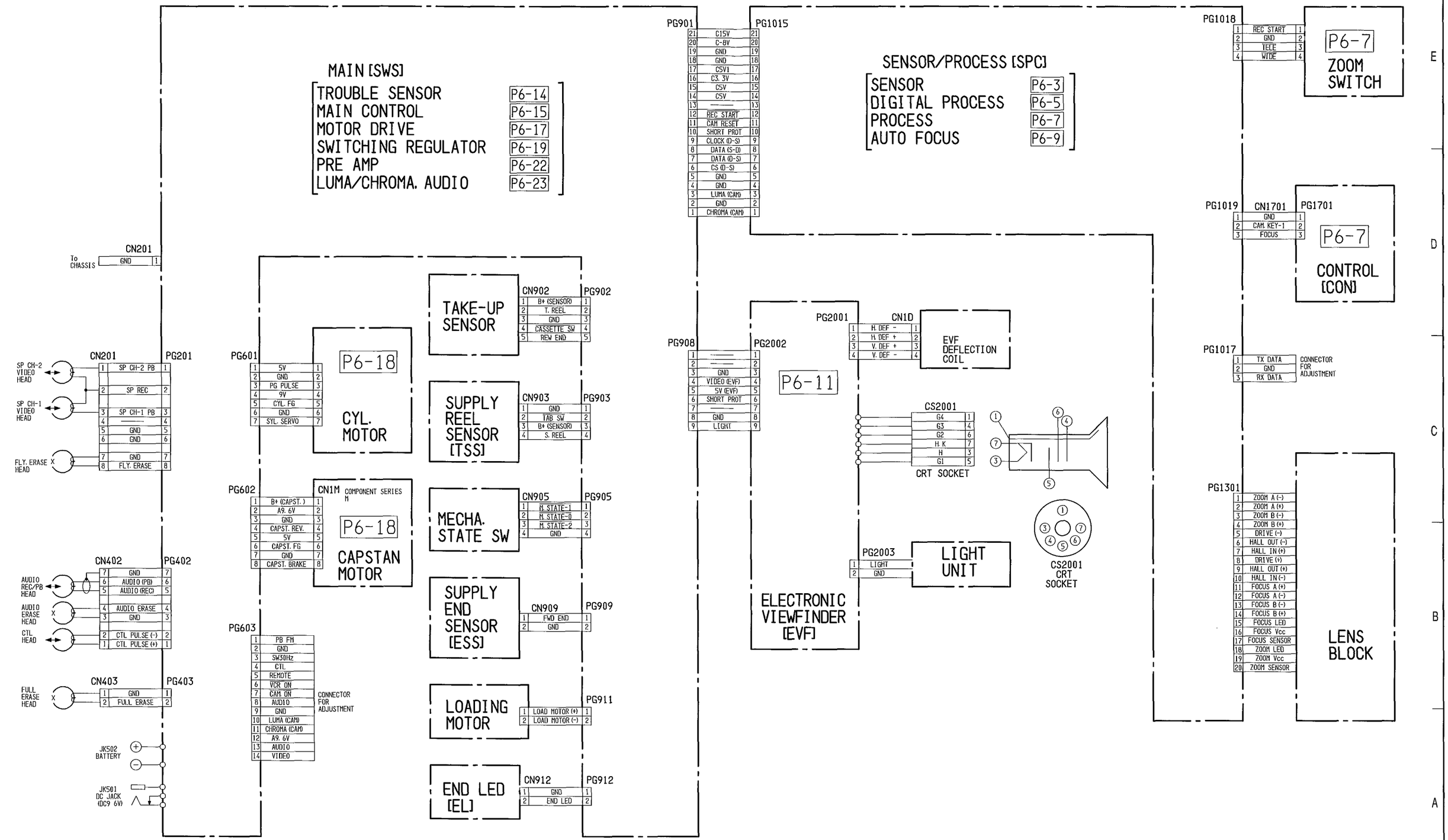
This table shows locations of each part on the circuit board diagrams. The locations are indicated using the guide scales on the external lines of diagrams.

1) In case of one-layer board

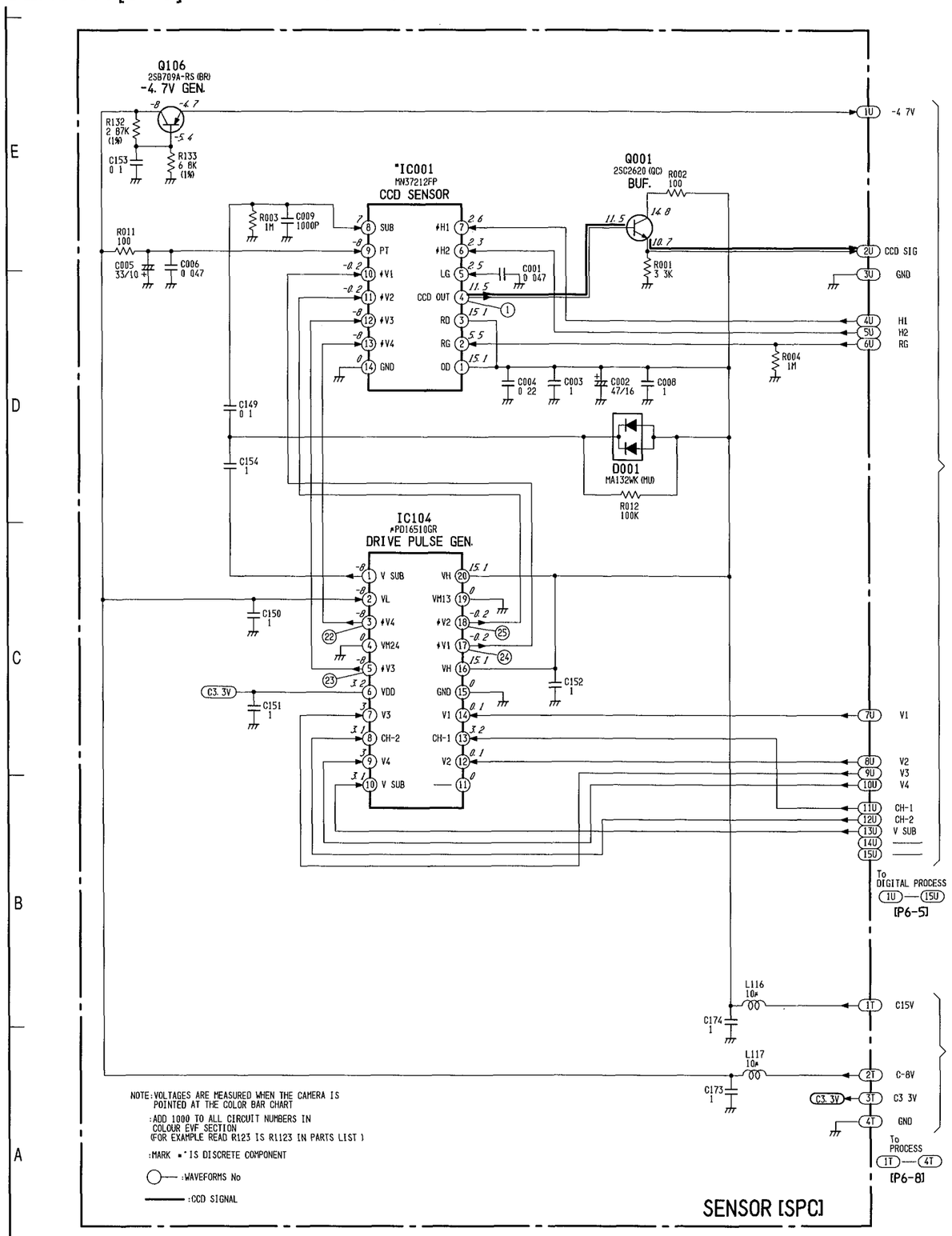


2) In case of side A/B indication board




MAIN [SWS]
TROUBLE SENSOR P6-14
MAIN CONTROL P6-15
MOTOR DRIVE P6-17
SWITCHING REGULATOR P6-19
PRE AMP P6-22
LUMA/CHROMA. AUDIO P6-23
SENSOR/PROCESS [SPC]
SENSOR P6-3
DIGITAL PROCESS P6-5
PROCESS P6-7
AUTO FOCUS P6-9
PG901
PG1015
21 C15V
20 C-8V
19 GND
18 GND
17 C5V1
16 C3.3V
15 C5V
14 C5V
13 ——
12 REC START
11 CAM RESET
10 SHORT PROT
9 CLOCK (D-S)
8 DATA (S-D)
7 DATA (D-S)
6 CS (D-S)
5 GND
4 GND
3 LUMA (CAM)
2 GND
1 CHROMA (CAM)
PG1018
1 REC START
2 GND
3 TELE
4 WIDE
P6-7
ZOOM SWITCH
PG1019
CN1701
PG1701
1 GND
2 CAM KEY-1
3 FOCUS
P6-7
CONTROL [CON]
PG1017
1 TX DATA
2 GND
3 RX DATA
CONNECTOR FOR ADJUSTMENT
CN201
To CHASSIS
GND 1
CN201
PG201
SP CH-2 VIDEO HEAD
SP CH-1 VIDEO HEAD
FLY. ERASE HEAD
1 SP CH-2 PB 1
2 SP REC 2
3 SP CH-1 PB 3
4 —— 4
5 GND 5
6 GND 6
7 GND 7
8 FLY. ERASE 8
PG601
1 5V
2 GND
3 PG PULSE
4 9V
5 CYL. FG
6 GND
7 SYL. SERVO
P6-18
CYL. MOTOR
TAKE-UP SENSOR
CN902
PG902
1 B+ (SENSOR)
2 T. REEL
3 GND
4 CASSETTE SW
5 REW END
SUPPLY REEL SENSOR [TSS]
CN903
PG903
1 GND
2 TAB SW
3 B+ (SENSOR)
4 S. REEL
PG602
CN1M COMPONENT SERIES M
1 B+ (CAPST.)
2 A9.6V
3 GND
4 CAPST. REV.
5 5V
6 CAPST. FG
7 GND
8 CAPST. BRAKE
P6-18
CAPSTAN MOTOR
MECHA. STATE SW
CN905
PG905
1 M. STATE-1
2 M. STATE-0
3 M. STATE-2
4 GND
CN402
PG402
AUDIO REC/PB HEAD
AUDIO ERASE HEAD
CTL HEAD
7 GND
6 AUDIO (PB)
5 AUDIO (REC)
4 AUDIO ERASE
3 GND
2 CTL PULSE (-)
1 CTL PULSE (+)
PG603
1 PB FM
2 GND
3 SW30Hz
4 CTL
5 REMOTE
6 VCR ON
7 CAM ON
8 AUDIO
9 GND
10 LUMA (CAM)
11 CHROMA (CAM)
12 A9.6V
13 AUDIO
14 VIDEO
CONNECTOR FOR ADJUSTMENT
SUPPLY END SENSOR [ESS]
CN909
PG909
1 FWD END
2 GND
CN403
PG403
FULL ERASE HEAD
1 GND
2 FULL ERASE
LOADING MOTOR
PG911
1 LOAD MOTOR (+)
2 LOAD MOTOR (-)
JK502 BATTERY
JK501 DC JACK (DC9.6V)
END LED [EL]
CN912
PG912
1 GND
2 END LED
PG908
PG2002
1 ——
2 ——
3 GND
4 VIDEO (EVF)
5 5V (EVF)
6 SHORT PROT
7 ——
8 GND
9 LIGHT
P6-11
PG2001
CN1D
1 H. DEF -
2 H. DEF +
3 V. DEF +
4 V. DEF -
EVF DEFLECTION COIL
CS2001
G4 1
G3 4
G2 6
H.K 7
H 3
G1 5
CRT SOCKET
PG2003
1 LIGHT
2 GND
LIGHT UNIT
CS2001 CRT SOCKET
ELECTRONIC VIEWFINDER [EVF]
PG1301
1 ZOOM A (-)
2 ZOOM A (+)
3 ZOOM B (-)
4 ZOOM B (+)
5 DRIVE (-)
6 HALL OUT (-)
7 HALL IN (+)
8 DRIVE (+)
9 HALL OUT (+)
10 HALL IN (-)
11 FOCUS A (+)
12 FOCUS A (-)
13 FOCUS B (-)
14 FOCUS B (+)
15 FOCUS LED
16 FOCUS Vcc
17 FOCUS SENSOR
18 ZOOM LED
19 ZOOM Vcc
20 ZOOM SENSOR
LENS BLOCK
E
D
C
B
A
1
2
3
4
5
6
7
8

SENSOR [SPC] SCHEMATIC DIAGRAM



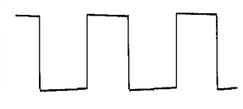
SENSOR/PROCESS WAVEFORMS

1-A IC1001-4 700mVp-p
0 2V/20 0 μ sec cm
COLOR CHART

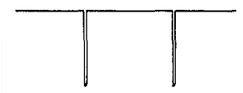
2-A IC1101-3 500mVp-p
0 2V/20 0 μ sec cm
COLOR CHART

3-A IC1102-31 2 1Vp-p
0 5V/20 0 μ sec cm
COLOR CHART

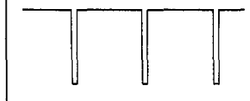
4-A IC1103-10 3 5Vp-p
1V/5 0msec cm
COLOR CHART



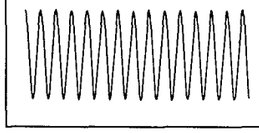
5-A IC1103-16 3 4Vp-p
1V/5 0msec cm
COLOR CHART



6-A IC1103-19 3.4Vp-p
1V/20 0 μ sec cm
COLOR CHART

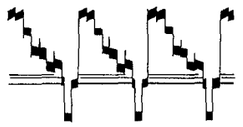


7-A IC1103-27 1 3Vp-p
0 5V/50 0nsec cm
COLOR CHART

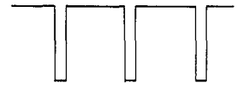


8-A IC1103-42 730mVp-p
0 2V/20 0 μ sec cm
COLOR CHART

9-A IC1103-46 1 0Vp-p
0 2V/20 0 μ sec cm
COLOR CHART



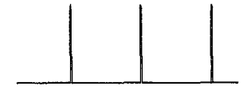
10-A IC1103-90 3 4Vp-p
1V/20 0 μ sec cm
COLOR CHART



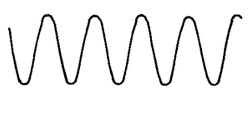
11-A IC1103-106 3.5Vp-p
1V/50 0nsec cm
COLOR CHART

12-A IC1103-107 3 5Vp-p
1V/50 0nsec cm
COLOR CHART

13-A IC1103-108 3 4Vp-p
1V/20 0 μ sec cm
COLOR CHART

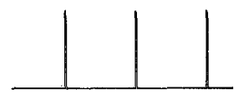


14-A IC1103-110 6 0Vp-p
2V/50 0nsec cm
COLOR CHART

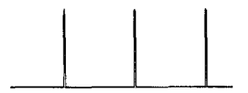


15-A IC1103-111 6 0Vp-p
2V/50 0nsec cm
COLOR CHART

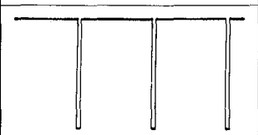
16-A IC1103-115 3 4Vp-p
1V/20 0 μ sec cm
COLOR CHART



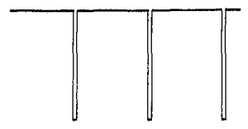
17-A IC1103-116 3 4Vp-p
1V/20 0 μ sec cm
COLOR CHART



18-A IC1103-117 3 4Vp-p
1V/20 0 μ sec cm
COLOR CHART

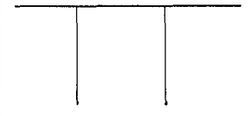


19-A IC1103-118 3 4Vp-p
1V/20 0 μ sec cm
COLOR CHART

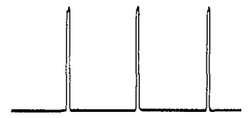


20-A IC1103-119 3 4Vp-p
1V/5 0msec cm
COLOR CHART

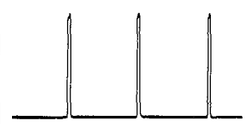
21-A IC1103-120 3 4Vp-p
1V/5 0msec cm
COLOR CHART



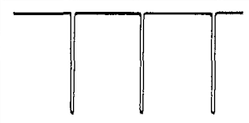
22-A IC1104-3 8 0Vp-p
2V/20 0 μ sec cm
COLOR CHART



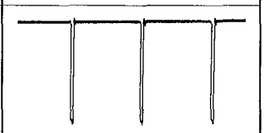
23-A IC1104-5 8 0Vp-p
2V/20 0 μ sec cm
COLOR CHART



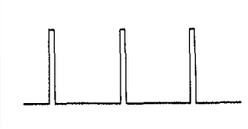
24-A IC1104-17 8 0Vp-p
2V/20 0 μ sec cm
COLOR CHART



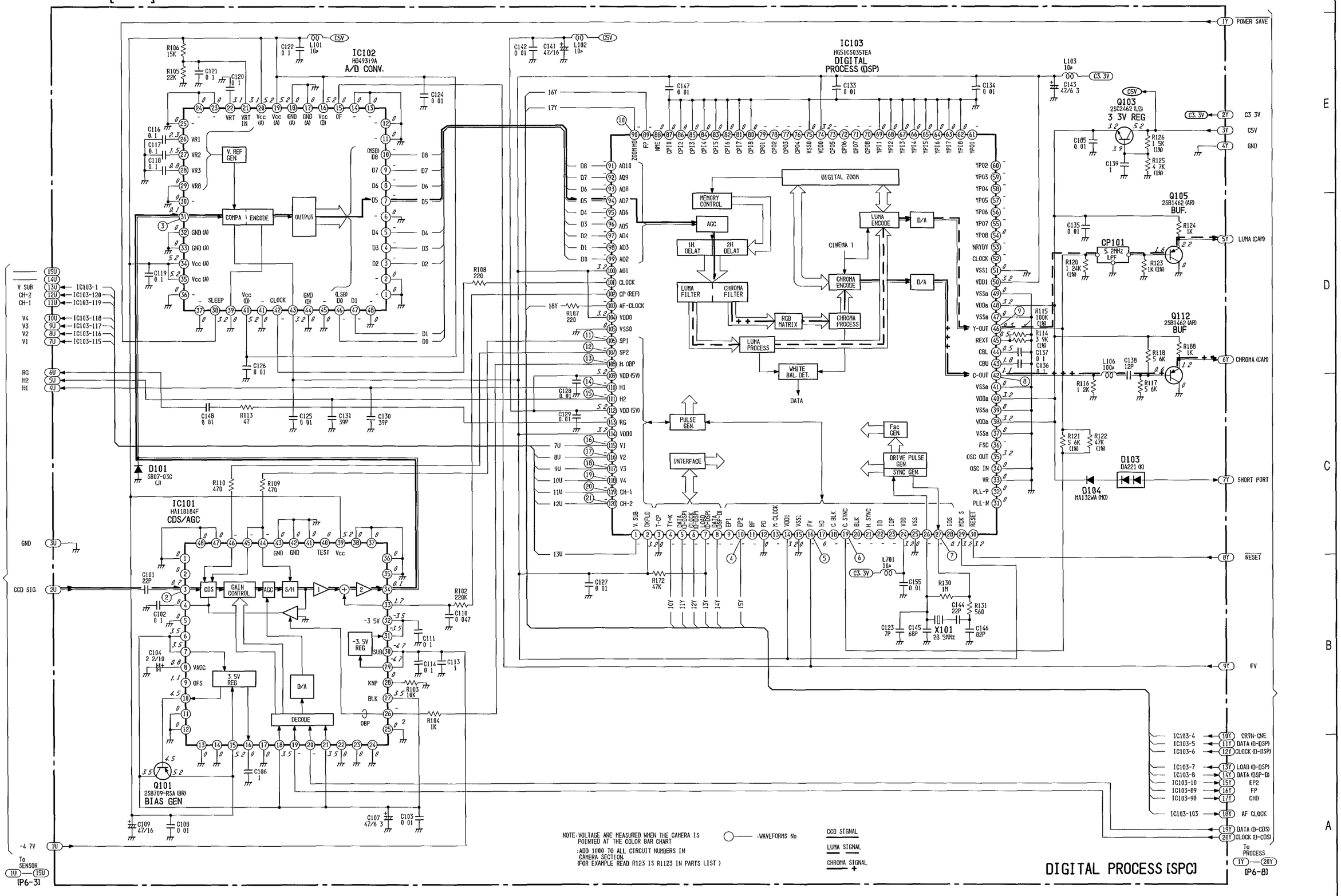
25-A IC1104-18 8 0Vp-p
2V/20 0 μ sec cm
COLOR CHART



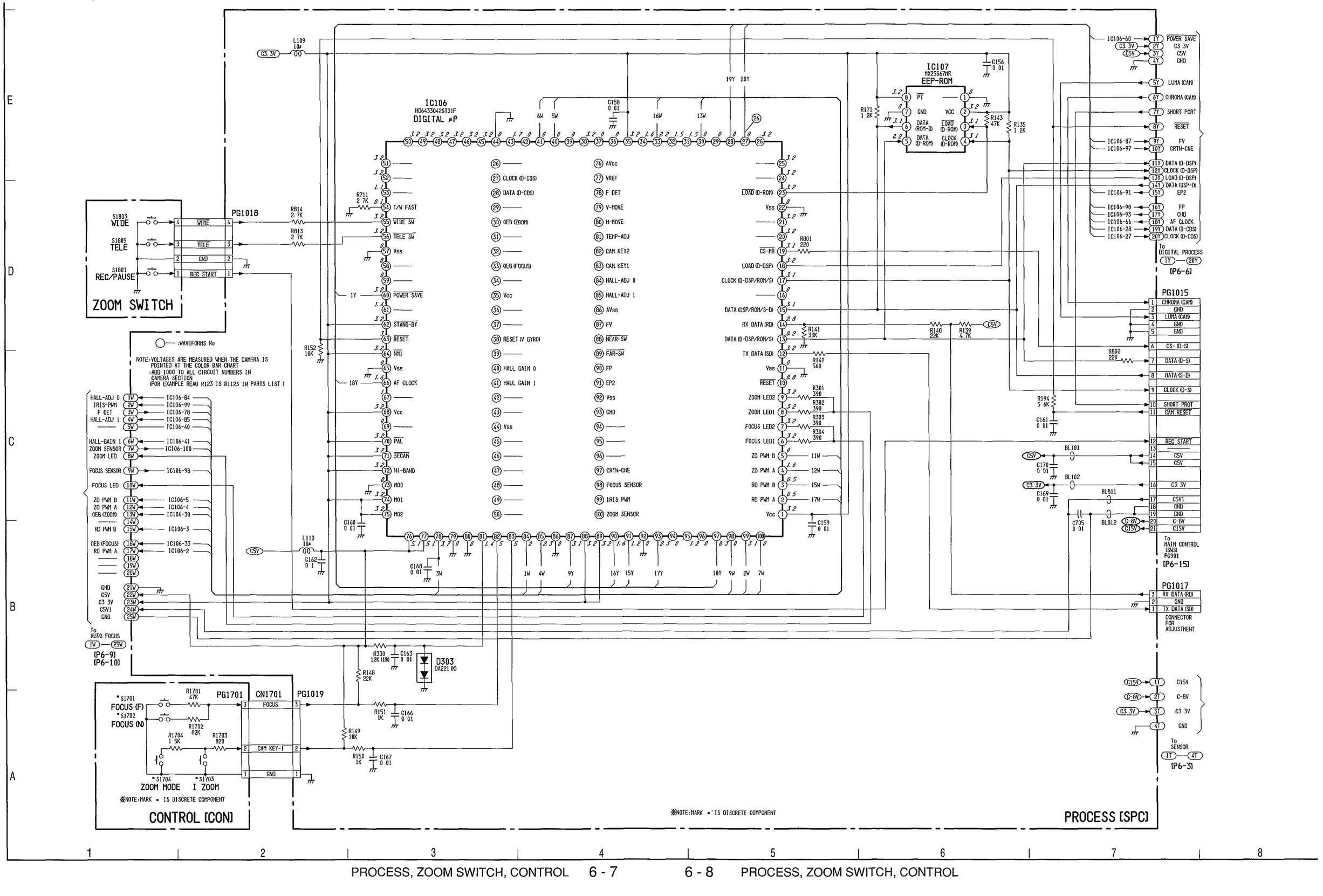
26-A IC1106-27 3 4Vp-p
1V/5 0msec cm
COLOR CHART



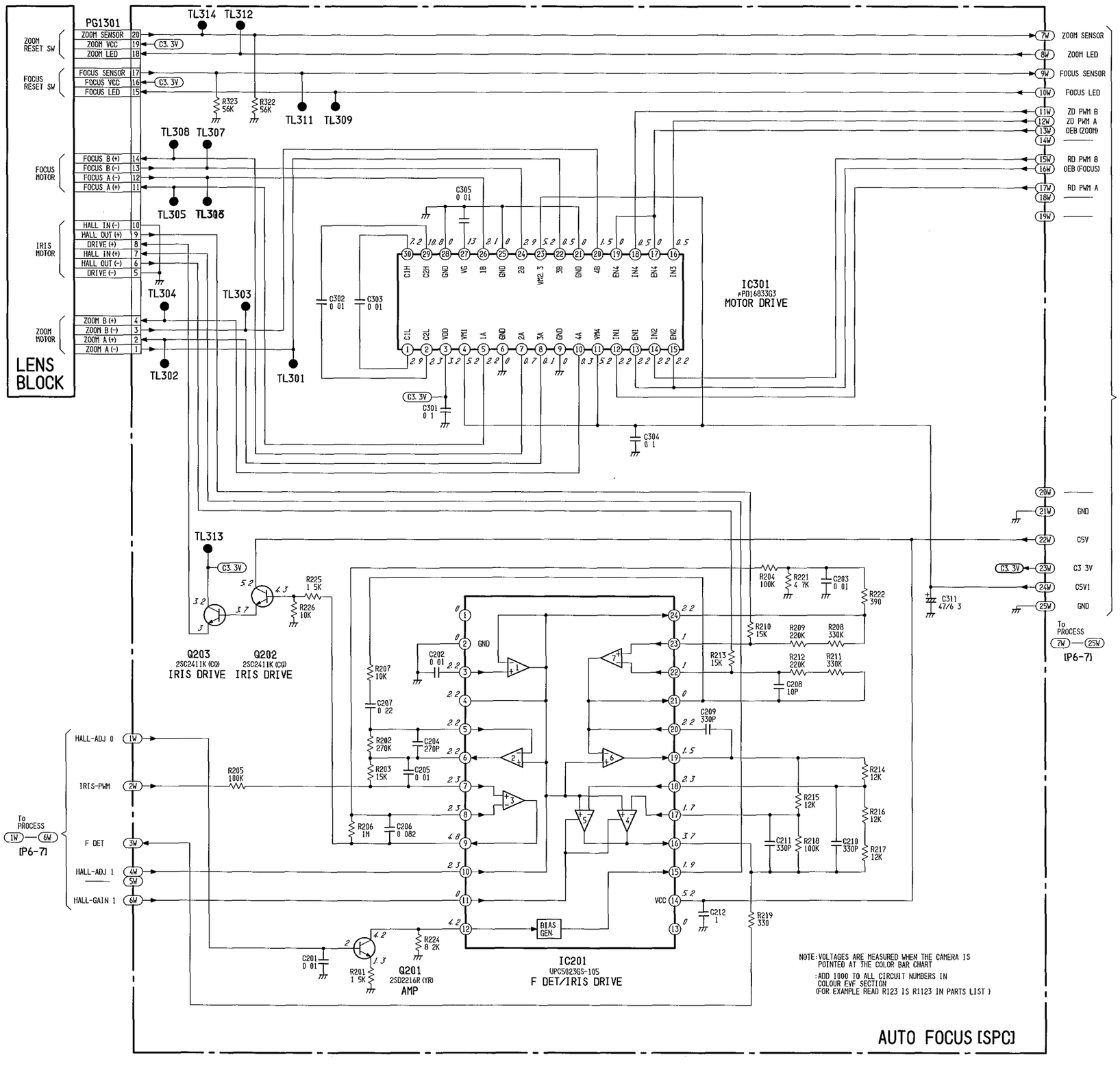
DIGITAL PROCESS [SPC] SCHEMATIC DIAGRAM



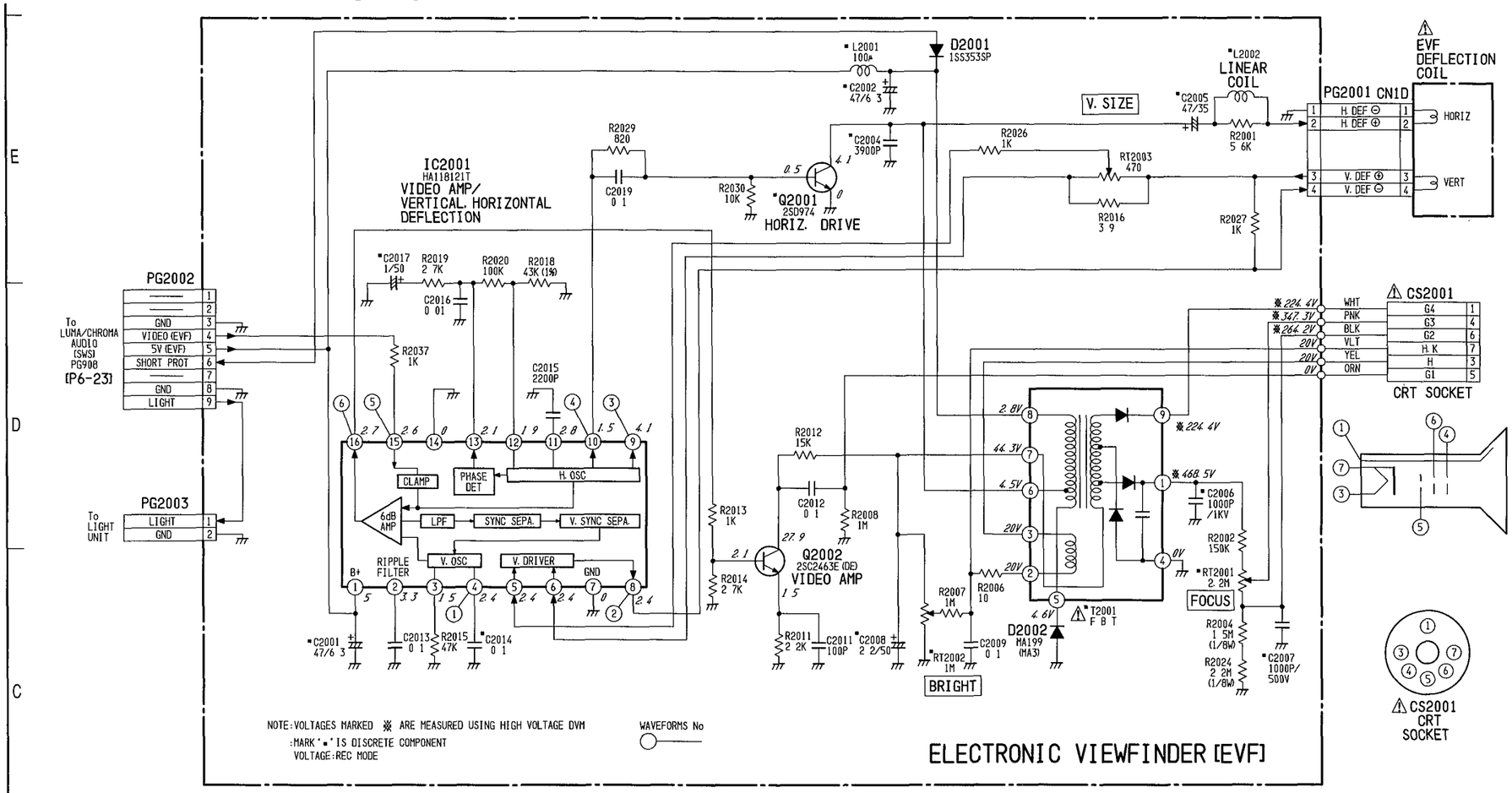
PROCESS [SPC], ZOOM SWITCH, CONTROL [CON] SCHEMATIC DIAGRAM



AUTO FOCUS [SPC] SCHEMATIC DIAGRAM



ELECTRONIC VIEWFINDER [EVF] SCHEMATIC DIAGRAM

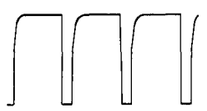


ELECTRONIC VIEWFINDER [EVF] WAVEFORMS

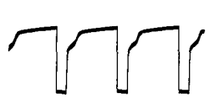
1-A IC2001-4 990mVp-p
0.2V/5.0msec.cm

2-A IC2001-8 2.2Vp-p
0.5V/5.0msec.cm

3-A IC2001-9 5.0Vp-p
1V/20.0μ sec.cm

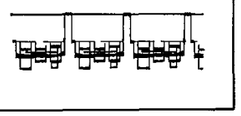


4-A IC2001-10 2.0Vp-p
0.5V/20.0μ sec.cm



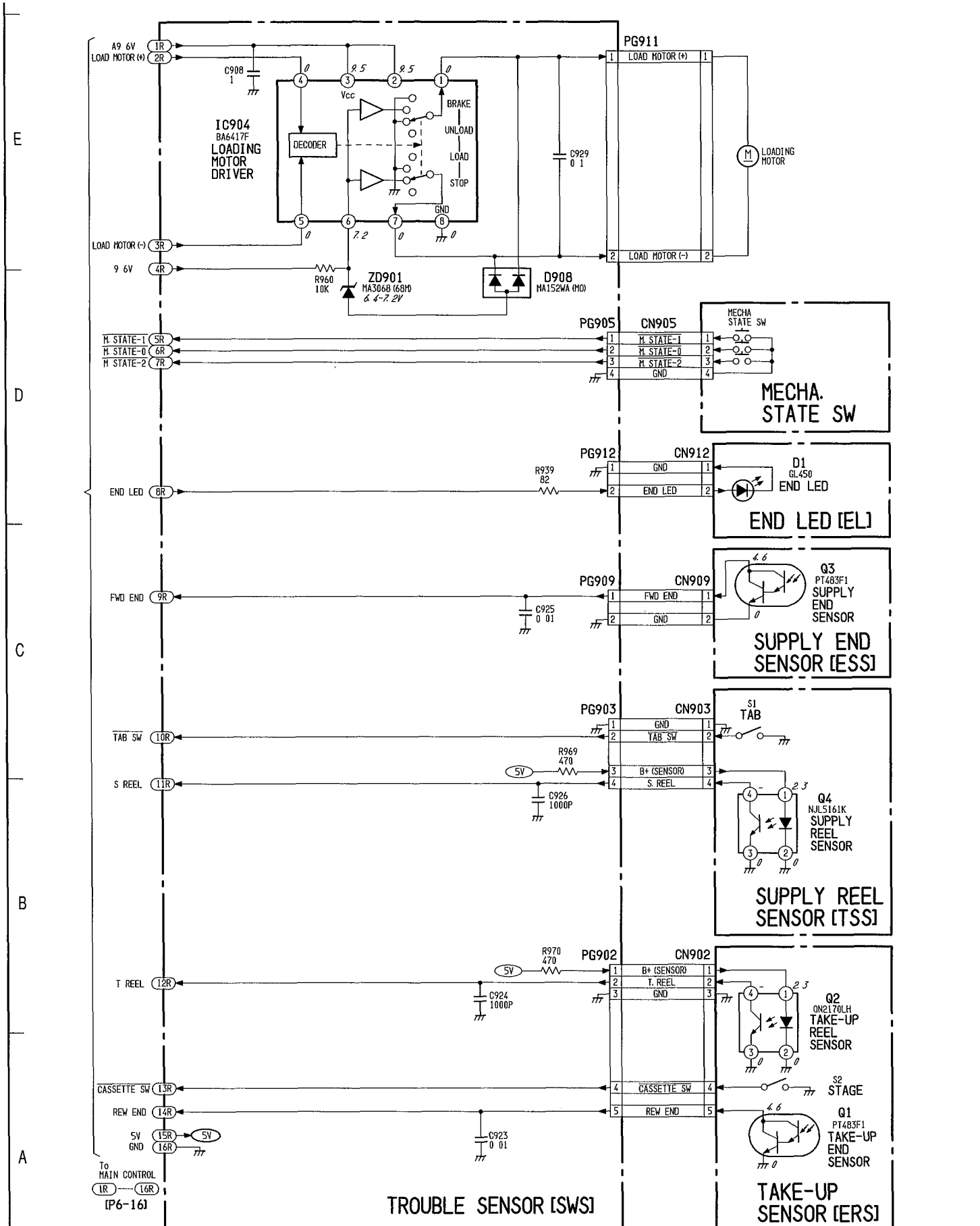
5-A IC2001-15 1.2Vp-p
0.2V/20.0μ sec.cm
COLOR CHART

6-A IC2001-16 3.8Vp-p
1V/20.0μ sec.cm
COLOR CHART

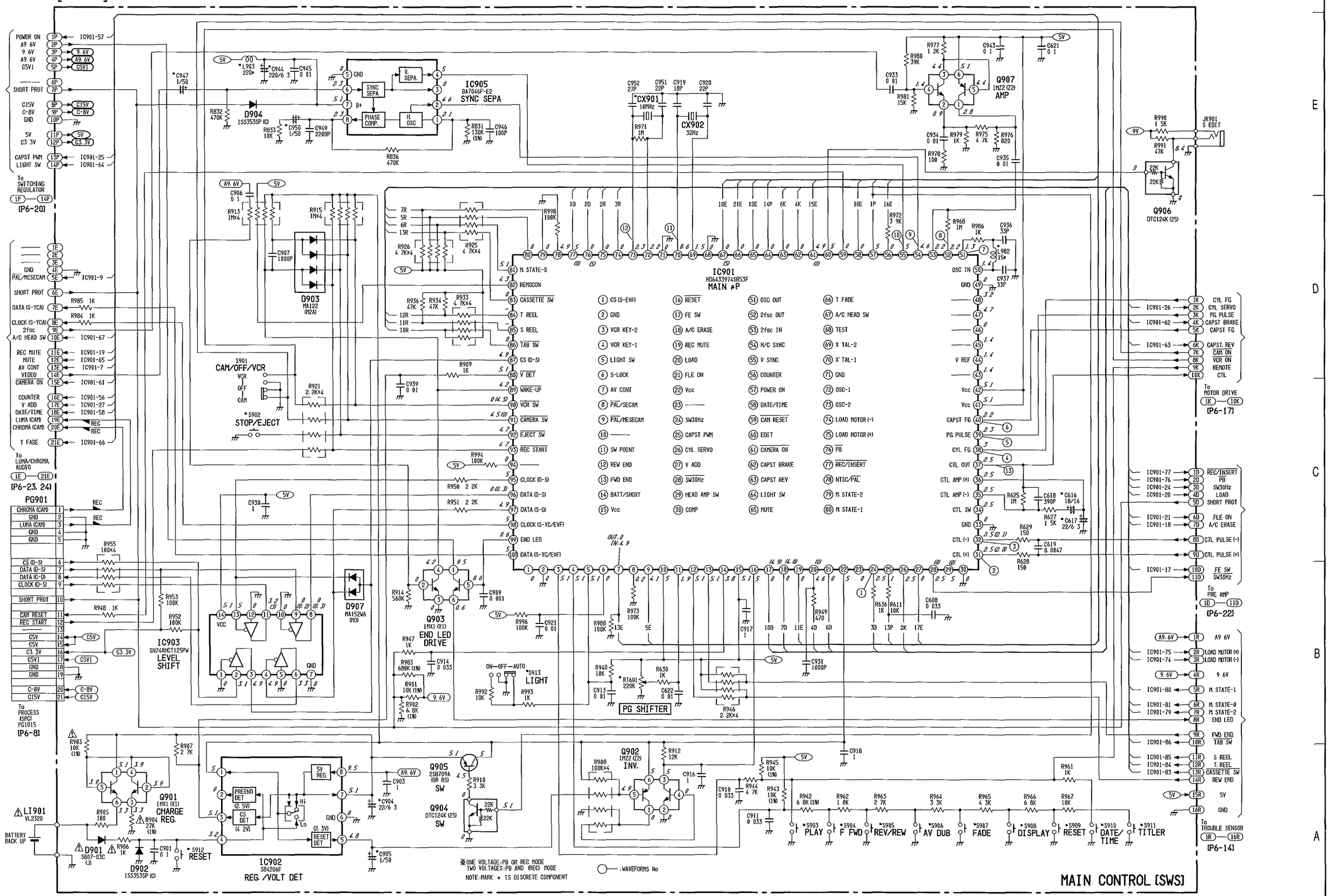


MEMO

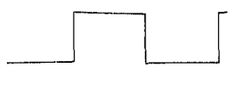
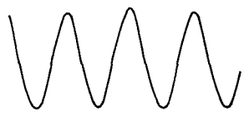
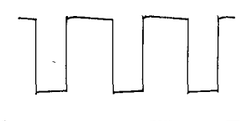
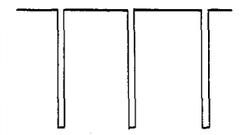
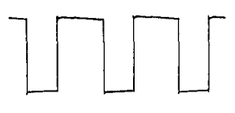
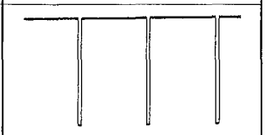
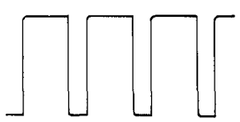
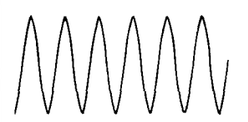
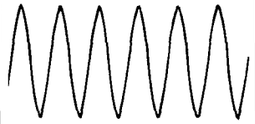
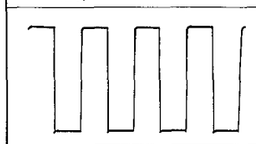
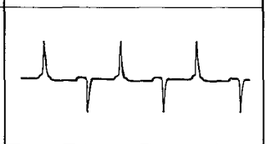
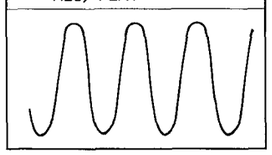
TROUBLE SENSOR [SWS] SCHEMATIC DIAGRAM



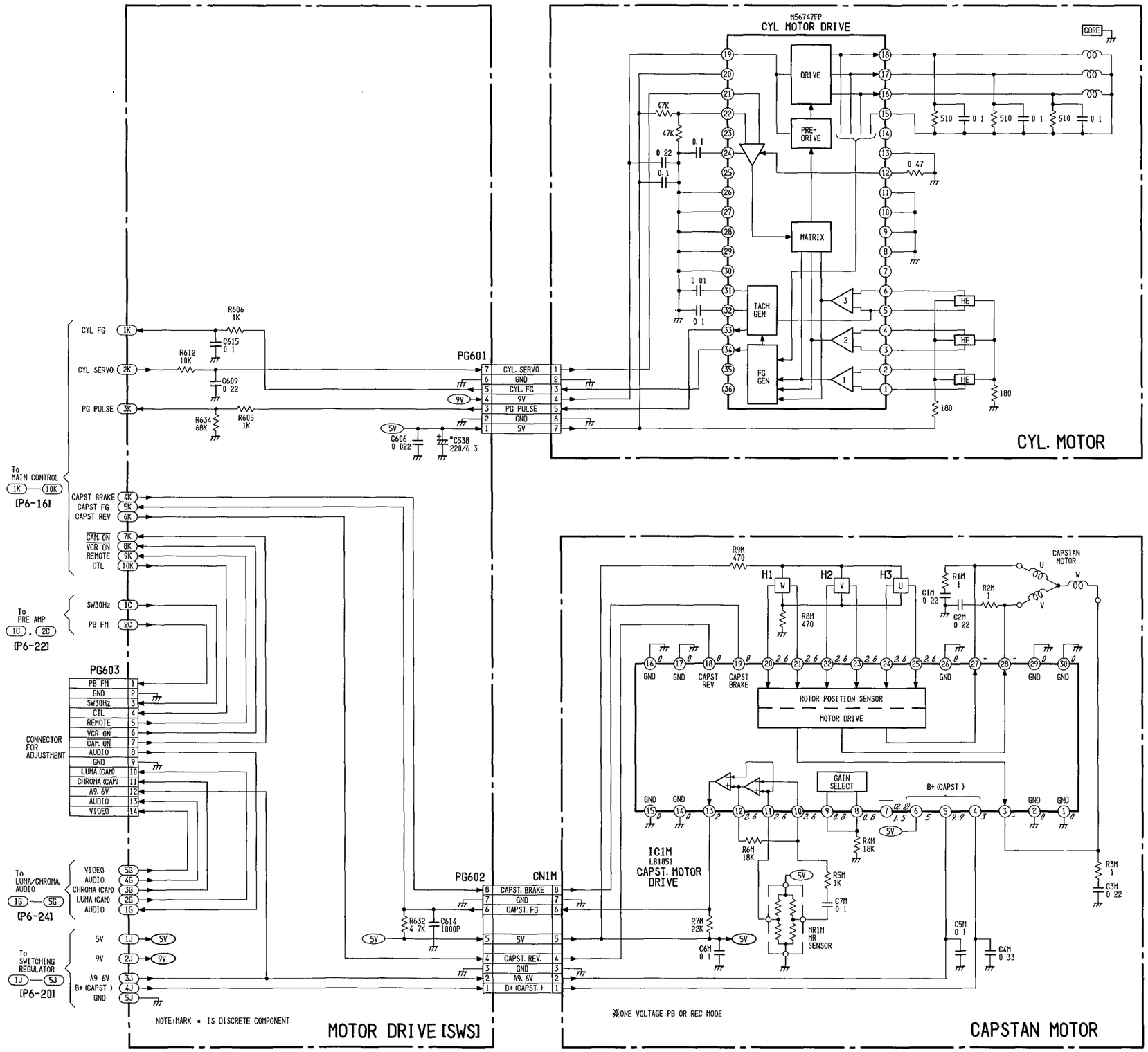
MAIN CONTROL [SWS] SCHEMATIC DIAGRAM



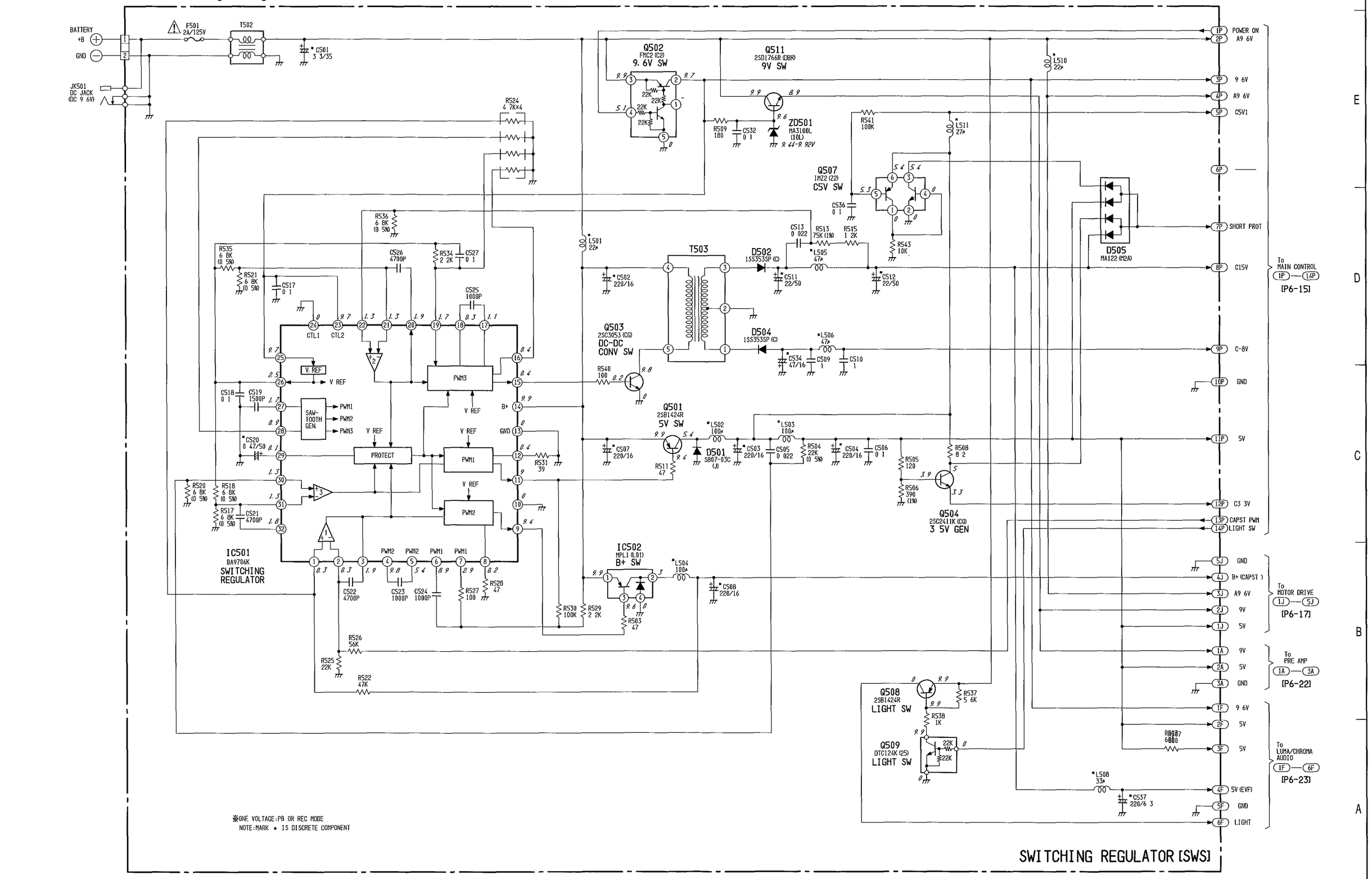
SERVO WAVEFORMS

1-A IC901-24 5.2Vp-p 2V/5.0msec cm REC/PLAY	8-A IC901-52 4.5Vp-p 1V/50.0nsec cm REC/PLAY
	
2-A IC901-31 3.4Vp-p 1V/10.0msec cm REC	9-A IC901-54 5.0Vp-p 1V/20.0 µsec cm REC/PLAY
	
3-A IC901-32 3.4Vp-p 1V/10.0msec cm REC	10-A IC901-55 5.1Vp-p 1V/5msec cm REC/PLAY
	
4-A IC901-38 4.5Vp-p 1V/1.0msec cm REC/PLAY	11-A IC901-70 1.9Vp-p 0.5V/20.0 µsec cm REC/PLAY
	
5-A IC901-39 4.5Vp-p 1V/10.0msec cm REC/PLAY	12-A IC901-73 4.7Vp-p 1V/50.0nsec cm REC/PLAY
	
6-A IC901-40 4.5Vp-p 1V/200 µsec cm REC/PLAY	13-B IC901-37 1.5Vp-p 0.5V/10.0msec cm PLAY
	
7-A IC901-51 5.0Vp-p 1V/50.0nsec cm REC/PLAY	
	

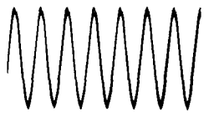
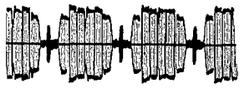
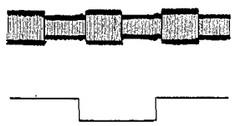
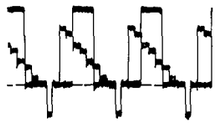
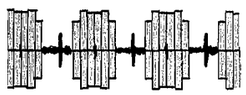
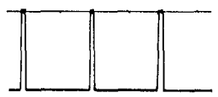
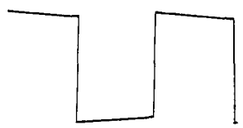
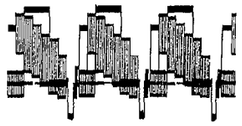
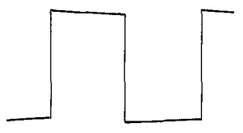
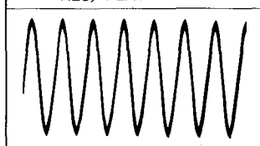
MOTOR DRIVE [SWS], CYL.MOTOR, CAPSTAN MOTOR DRIVE SCHEMATIC DIAGRAMS



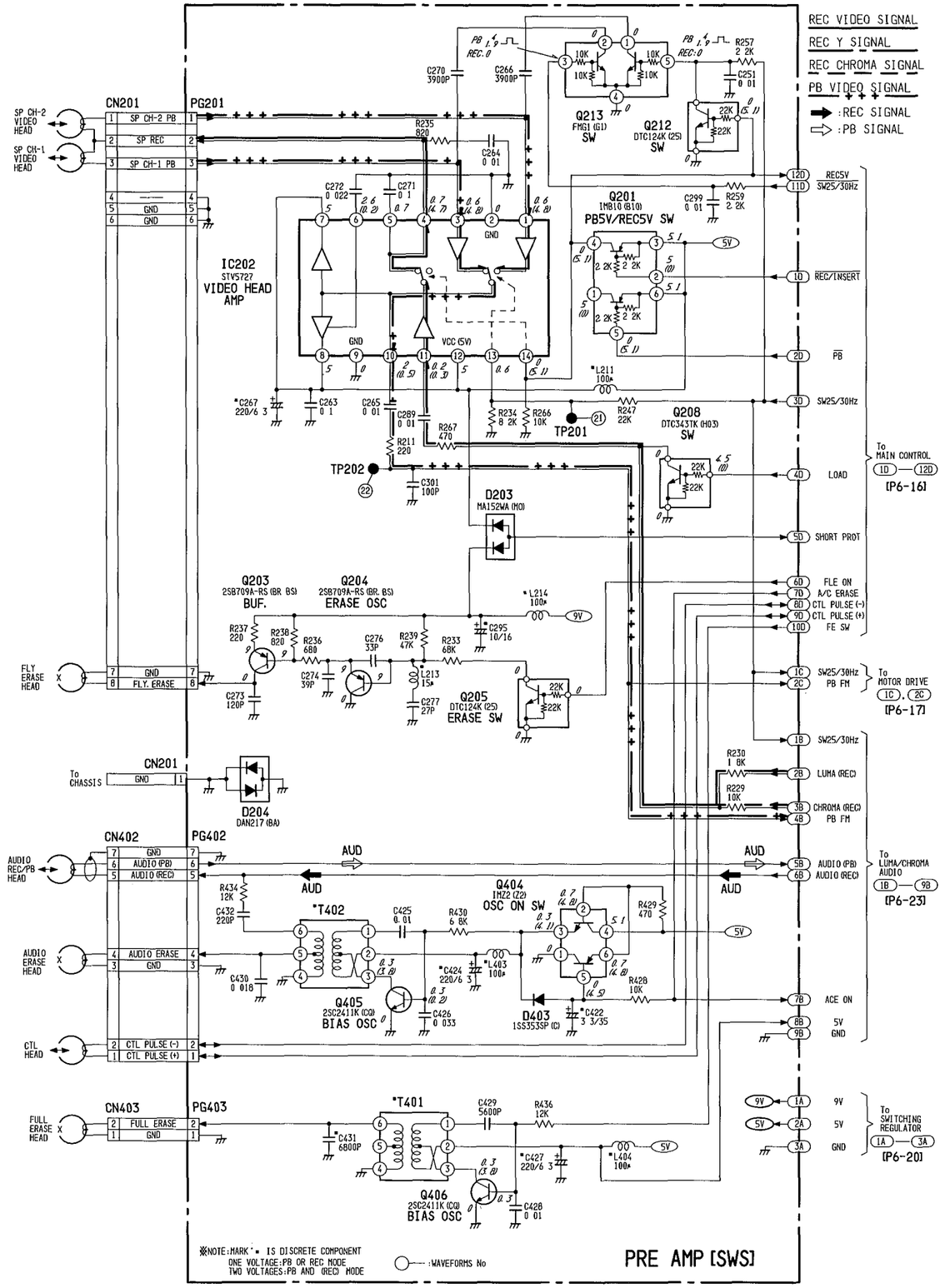
SWITCHING REGULATOR [SWS] SCHEMATIC DIAGRAM



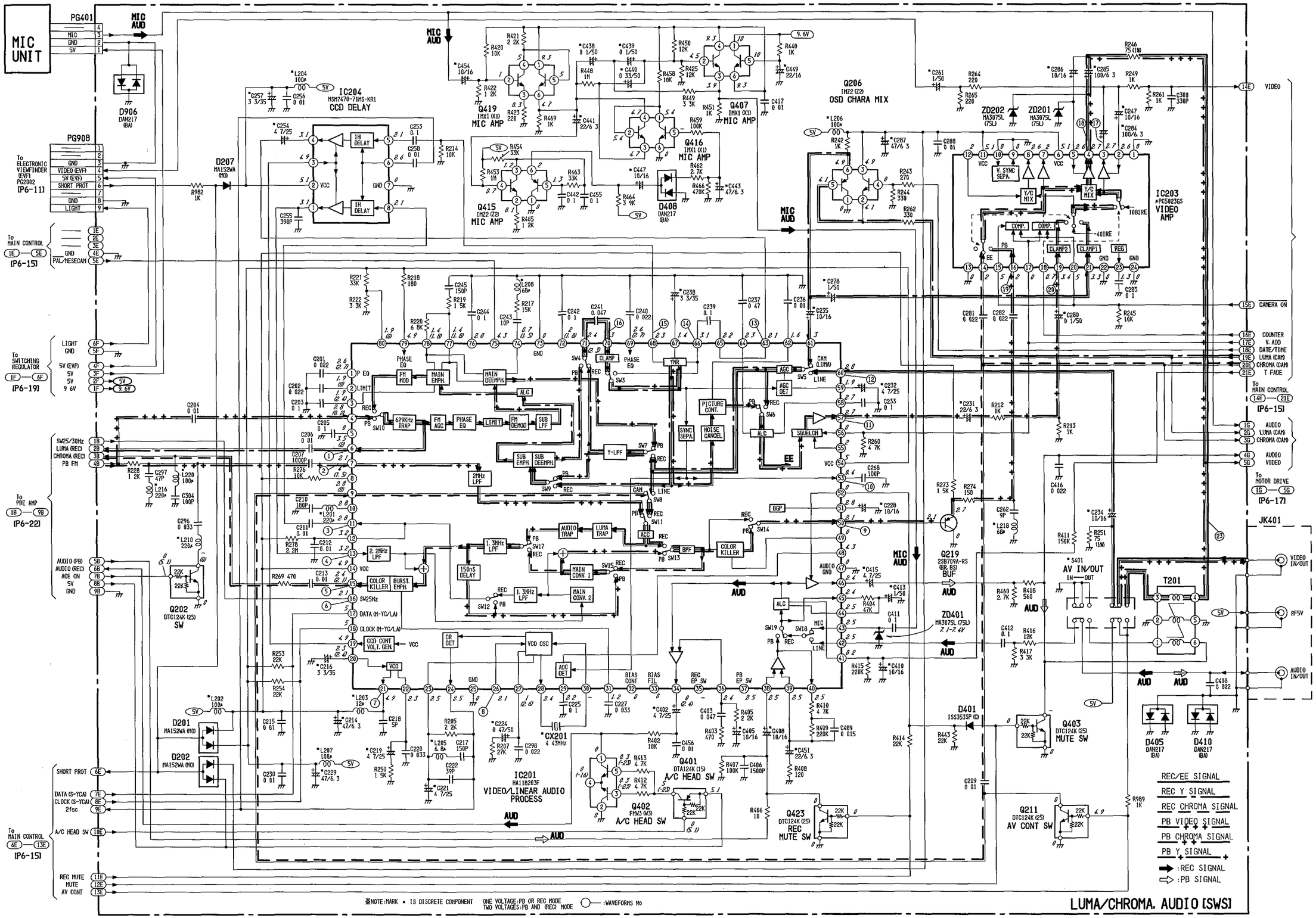
LUMA/CHROMA WAVEFORMS

1-A IC201-6 320mVp-p 0 1V/5 0msec cm REC	8-A IC201-26 950mVp-p 0 2V/200nsec cm REC/PLAY	14-A IC201-66 510mVp-p 0 2V/20 0 µ sec cm REC/PLAY	19-B IC203-16 630mVp-p 0 2V/20 0 µ sec cm PLAY
			
2-B IC201-7 200mVp-p 0.1V/5 0msec cm PLAY	9-B IC201-50 540mVp-p 0 2V/20 0 µ sec cm PLAY	15-A IC201-68 410mVp-p 0.1V/20 0 µ sec cm REC/PLAY	20-B IC203-19 1Vp-p 0 2V/20 0 µ sec cm PLAY
			
3-A IC201-11 340mVp-p 0 1V/20 0 µ sec cm REC/PLAY	10-A IC201-53 4 7Vp-p 1V/20 0 µ sec. cm REC/PLAY	16-A IC201-70 500mVp-p 0 1V/20 0 µ sec cm REC/PLAY	21-A TP201 5 0Vp-p 1V/5 0msec cm REC/PLAY
			
4-A IC201-13 500mVp-p 0 2V/20 0nsec. cm REC/PLAY	11-A IC201-57 2 1Vp-p 0 5V/20 0 µ sec. cm REC	17-A IC203-3 2 0Vp-p 0 5V/20 0 µ sec cm REC	22-B TP202 300mVp-p 0 1V/5 0msec cm PLAY
			
5-A IC201-15 460mVp-p 0 2V/20 0 µ sec cm REC	11-B IC201-57 2 1Vp-p 0 5V/20 0 µ sec cm PLAY	17-B IC203-3 1 9Vp-p 0 5V/20 0 µ sec cm PLAY	
6-A IC201-16 5 0Vp-p 1V/5 0msec cm REC/PLAY	12-A IC201-60 1 0Vp-p 0 2V/20 0 µ sec cm REC	18-A IC203-4 2 0Vp-p 0 5V/20.0 µ sec cm REC	
			
7-A IC201-21 510mVp-p 0 1V/100nsec cm REC/PLAY	13-A IC201-63 680mVp-p 0 2V/20 0 µ sec cm REC/PLAY	18-B IC203-4 1 9Vp-p 0 5V/20 0 µ sec cm PLAY	
			

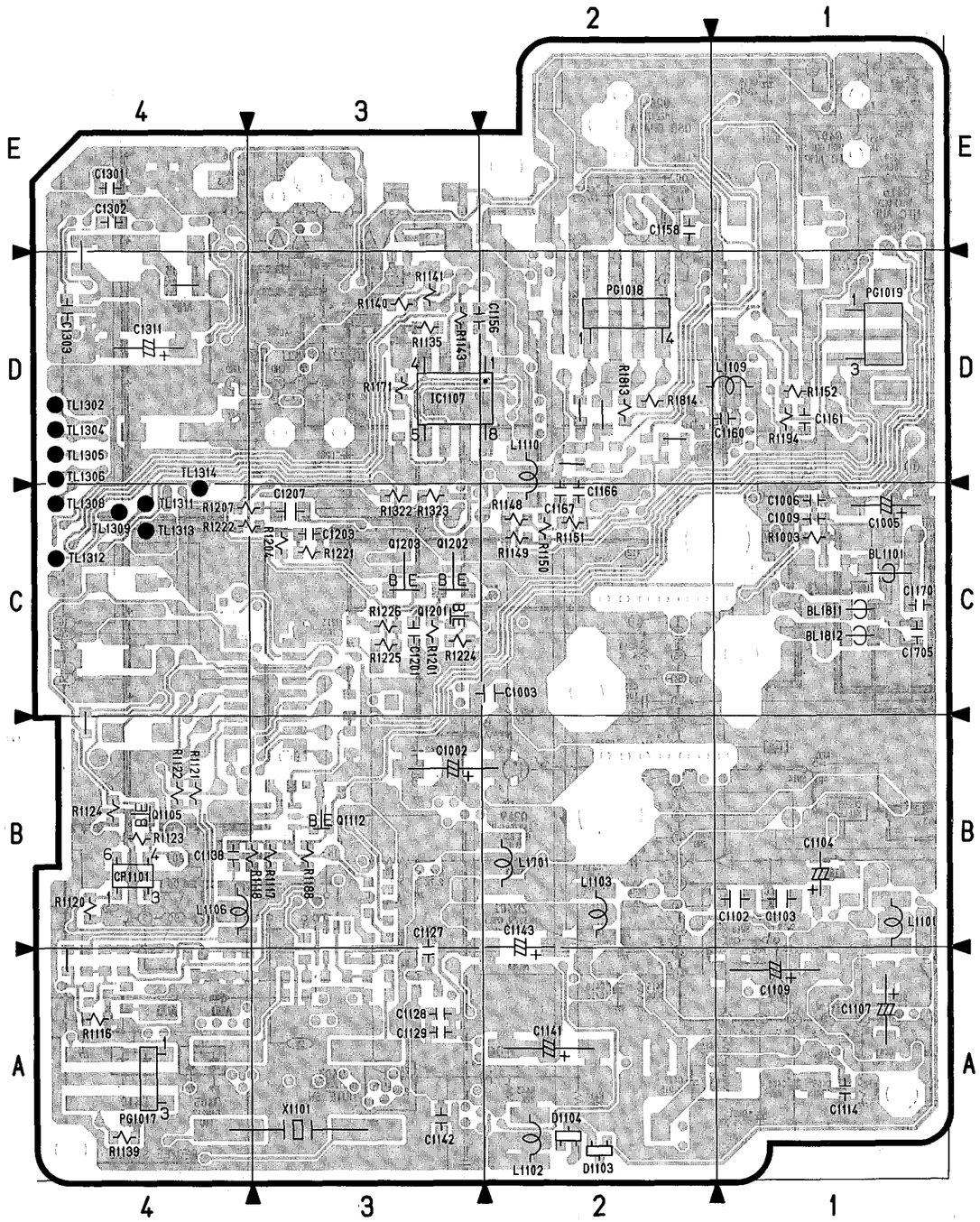
PRE AMP [SWS] SCHEMATIC DIAGRAMS



LUMA/CHROMA, AUDIO [SWS] SCHEMATIC DIAGRAM



SPC CIRCUIT BOARD -SIDE A-



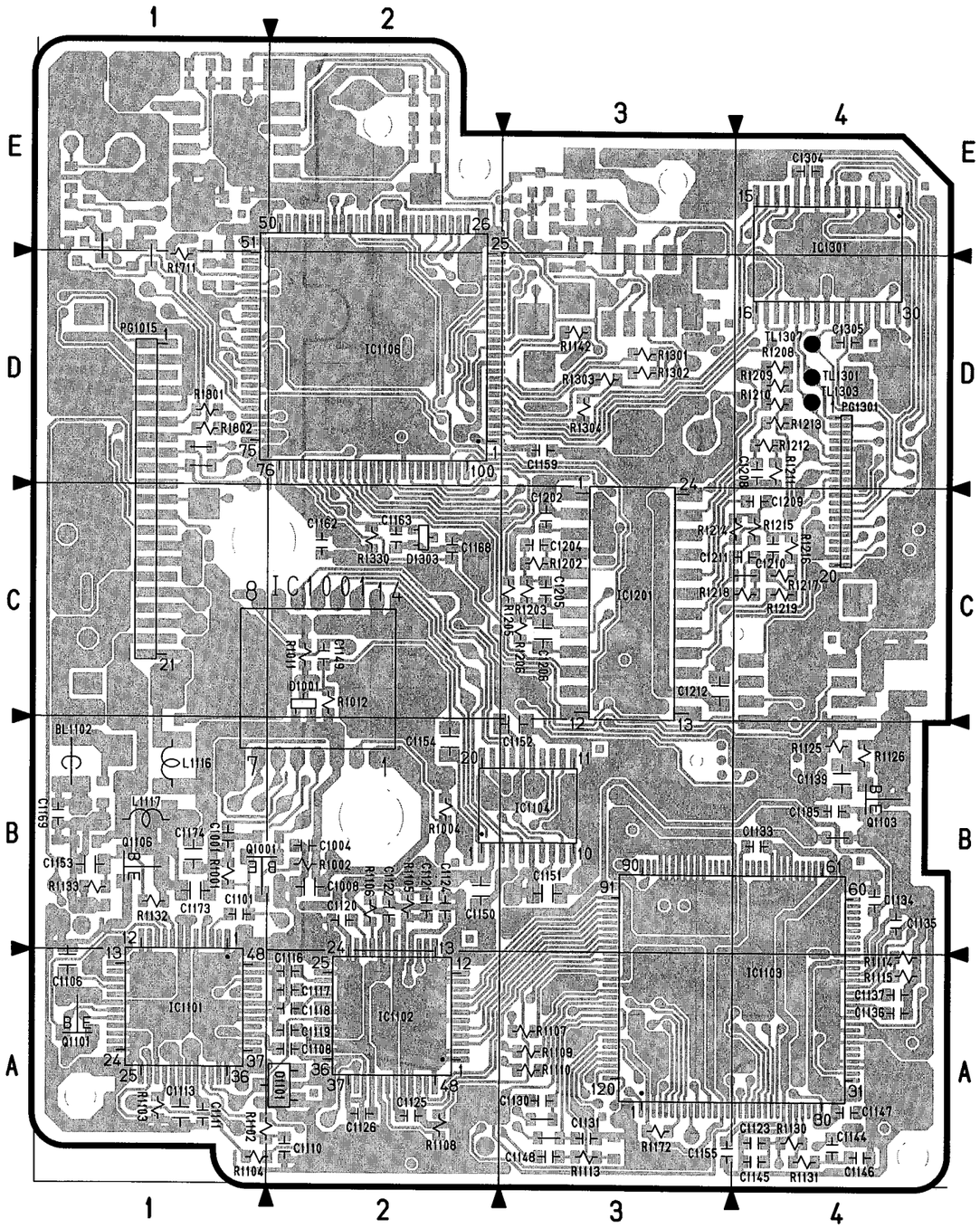
SPC[SENSOR/PROCESS]
-SIDE A-
[PATTERN No.JA1372-6]

IDENTIFICATION OF PARTS LOCATION

SPC [SENSOR/PROCESS]

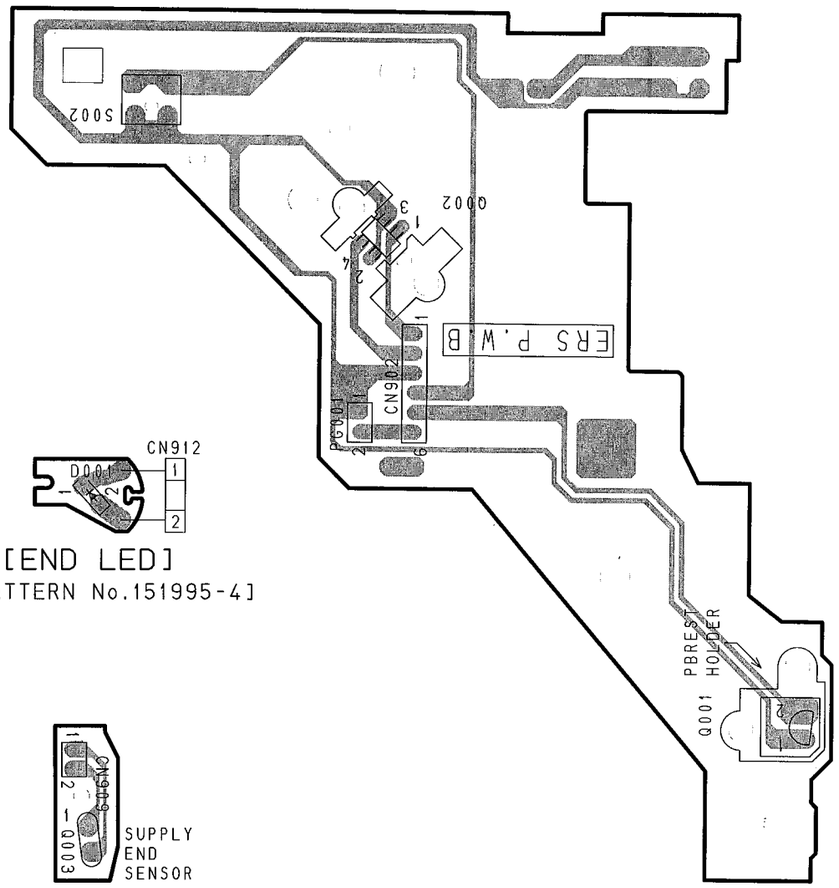
Symbol No	Parts Location
BL	
BL1101	A-1C
BL1102	B-1B
BL1811	A-1C
BL1812	A-1C
C	
C1001	B-1B
C1002	A-3B
C1003	A-2C
C1004	B-2B
C1005	A-1C
C1006	A-1C
C1008	B-2B
C1009	A-1C
C1101	B-1B
C1102	A-1B
C1103	A-1B
C1104	A-1B
C1106	B-1A
C1107	A-1A
C1108	B-2A
C1109	A-1A
C1110	B-2A
C1111	B-1A
C1113	B-1A
C1114	A-1A
C1116	B-2A
C1117	B-2A
C1118	B-2A
C1119	B-2A
C1120	B-2B
C1121	B-2B
C1122	B-2B
C1123	B-4A
C1124	B-2B
C1125	B-2A
C1126	B-2A
C1127	A-3A
C1128	A-3A
C1129	A-3A
C1130	B-3A
C1131	B-3A
C1133	B-4B
C1134	B-4B
C1135	B-4B
C1136	B-4A
C1137	B-4A
C1138	A-4B
C1139	B-4B
C1141	A-2A
C1142	A-3A
C1143	A-2B
C1144	B-4A
C1145	B-4A
C1146	B-4A
C1147	B-4A
C1148	B-3A
C1149	B-2C
C1150	B-2B
C1151	B-3B
C1152	B-3B
C1153	B-1B
C1154	B-2B
C1155	B-3A
C1156	A-2D
C1158	A-2E
C1159	B-3D
C1160	A-1D
C1161	A-1D
C1162	B-2C
C1163	B-2C
C1166	A-2C
C1167	A-2C
C1168	B-2C
C1169	B-1B
C1170	A-1C
C1173	B-1B
C1174	B-1B
C1185	B-4B
C1201	A-3C
C1202	B-3C
C1203	A-3C
C1204	B-3C
C1205	B-3C
C1206	B-3C
C1207	A-3C
C1208	B-4D
C1209	B-4C
C1210	B-4C
C1211	B-4C
C1212	B-3C
C1301	A-4E
C1302	A-4E
C1303	A-4D
C1304	B-4E
C1305	B-4D
C1311	A-4D
C1705	A-1C
CP	
CP1101	A-4B
D	
D1001	B-2C
D1101	B-2A
D1103	A-2A
D1104	A-2A
D1303	B-2C
IC	
IC1001	B-2C
IC1101	B-1A
IC1102	B-2A
IC1103	B-3A
IC1104	B-3B
IC1106	B-2D
IC1107	A-3D
IC1201	B-3C
IC1301	B-4E
L	
L1101	A-1B
L1102	A-2A
L1103	A-2B
L1106	A-4B
L1109	A-1D
L1110	A-2D
L1116	B-1B
L1117	B-1B
L1701	A-2B
PG	
PG1015	B-1C
PG1017	A-4A
PG1018	A-2D
PG1019	A-1D
PG1301	B-4D
Q	
Q1001	B-1B
Q1101	B-1A
Q1103	B-4B
Q1105	A-4B
Q1106	B-1B
Q1112	A-3B
Q1201	A-3C
Q1202	A-3C
Q1203	A-3C
R	
R1001	B-1B
R1002	B-2B
R1003	A-1C
R1004	B-2B
R1011	B-2C
R1012	B-2C
R1102	B-1A
R1103	B-1A
R1104	B-1A
R1105	B-2B
R1106	B-2B
R1107	B-3A
R1108	B-2A
R1109	B-3A
R1110	B-3A
R1113	B-3A
R1114	B-4A
R1115	B-4A
R1116	A-4A
R1117	A-3B
R1118	A-3B
R1120	A-4B
R1121	A-4B
R1122	A-4B
R1123	A-4B
R1124	A-4B
R1125	B-4B
R1126	B-4B
R1130	B-4A
R1131	B-4A
R1132	B-1B
R1133	B-1B
R1135	A-3D
R1139	A-4A
R1140	A-3D
R1141	A-3D
R1142	B-3D
R1143	A-3D
R1148	A-2C
R1149	A-2C
R1150	A-2C
R1151	A-2C
R1152	A-1D
R1171	A-3D
R1172	B-3A
R1188	A-3B
R1194	A-1D
R1201	A-3C
R1202	B-3C
R1203	B-3C
R1204	A-3C
R1205	B-3C
R1206	B-3C
R1207	A-4C
R1208	B-4D
R1209	B-4D
R1210	B-4D
R1211	B-4D
R1212	B-4D
R1213	B-4D
R1214	B-4C
R1215	B-4C
R1216	B-4C
R1217	B-4C
R1218	B-4C
R1219	B-4C
R1221	A-3C
R1222	A-4C
R1224	A-3C
R1225	A-3C
R1226	A-3C
R1301	B-3D
R1302	B-3D
R1303	B-3D
R1304	B-3D
R1322	A-3C
R1323	A-3C
R1330	B-2C
R1711	B-1D
R1801	B-1D
R1802	B-1D
R1813	A-2D
R1814	A-2D
TL	
TL1301	B-4D
TL1302	A-4D
TL1303	B-4D
TL1304	A-4D
TL1305	A-4D
TL1306	A-4D
TL1307	B-4D
TL1308	A-4C
TL1309	A-4C
TL1311	A-4C
TL1312	A-4C
TL1313	A-4C
TL1314	A-4C
X	
X1101	A-3A

SPC CIRCUIT BOARD – SIDE B –



SPC[SENSOR/PROCESS]
-SIDE B-
[PATTERN No.JA1372-6]

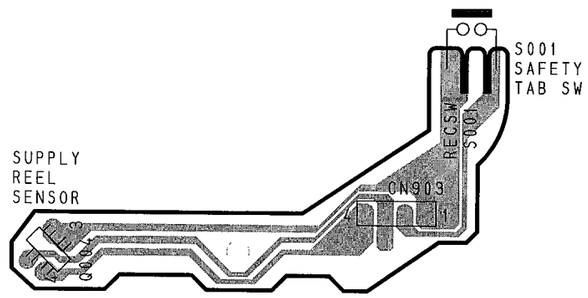
ERS, TSS, EL, ESS CIRCUIT BOARD



EL[END LED]
[PATTERN No.151995-4]

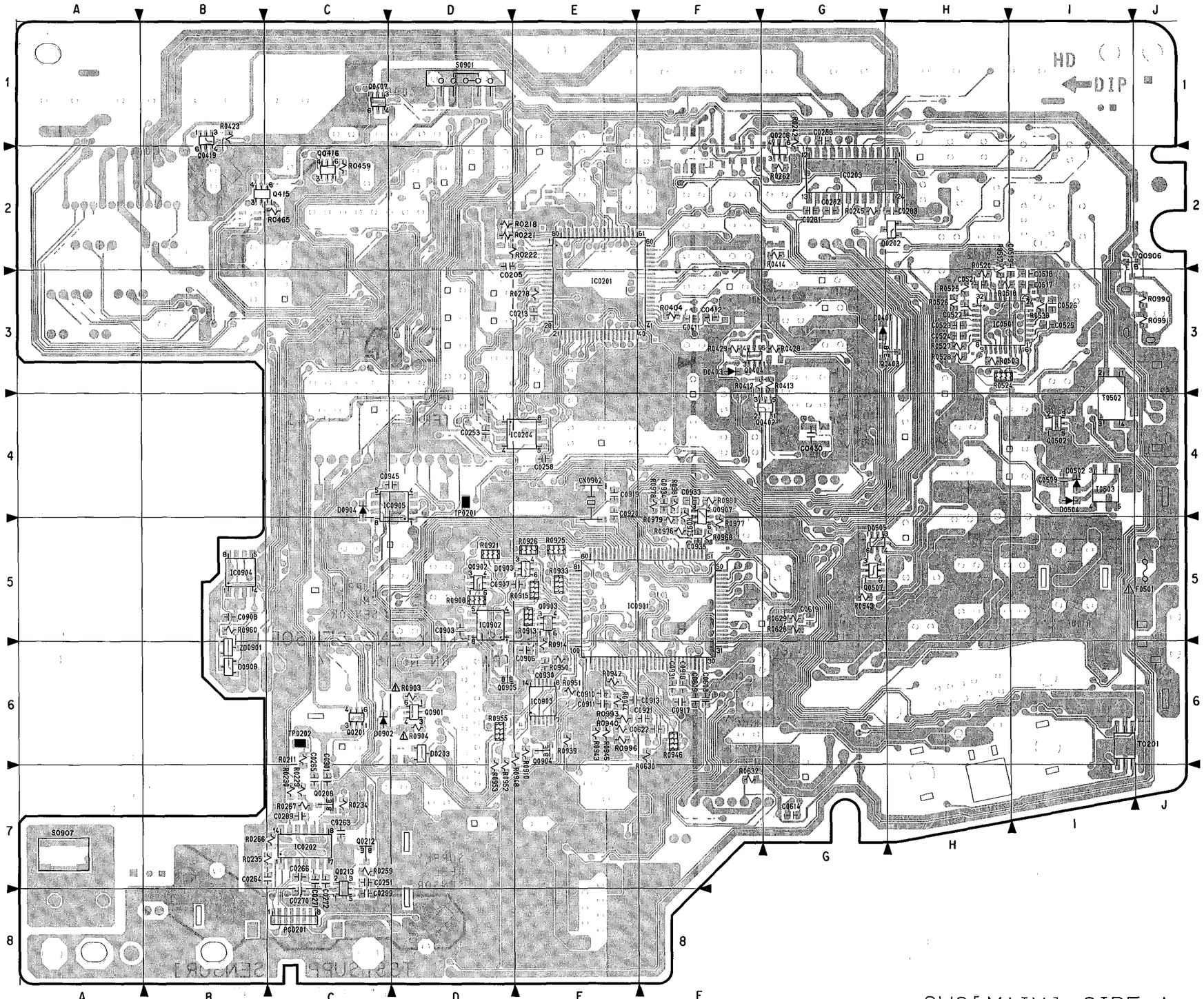
ESS[SUPPLY END SENSOR]
[PATTERN No.151995-4]

ERS[TAKE-UP SENSOR]
[PATTERN No.151995-4]



TSS[SUPPLY SENSOR]
[PATTERN No.151995-4]

SWS CIRCUIT BOARD – SIDE A –



SWS[MAIN]-SIDE A-
[PATTERN No.JK1248-4]

IDENTIFICATION OF PARTS LOCATION

SWS [MAIN] 1/2

Symbol No	Parts Location
C	
C0201	B-7D
C0202	B-6E
C0203	B-6E
C0204	B-6D
C0205	A-2D
C0206	B-6D
C0207	B-6D
C0209	B-6C
C0210	B-6D
C0211	B-6E
C0212	B-6E
C0213	A-3E
C0214	B-6D
C0215	B-6E
C0216	B-5D
C0217	B-5E
C0218	B-5E
C0219	B-5E
C0220	B-5E
C0221	B-5E
C0222	B-5E
C0224	B-5F
C0225	B-6E
C0227	B-6E
C0228	B-6F
C0229	B-6G
C0230	B-6F
C0231	B-7F
C0232	B-7F
C0233	B-6F
C0234	B-7F
C0235	B-7F
C0236	B-6E
C0237	B-6E
C0238	B-7E
C0239	B-7E
C0240	B-7E
C0241	B-7E
C0242	B-6E
C0243	B-7E
C0244	B-6E
C0245	B-7E
C0247	B-7H
C0251	A-7C
C0253	A-4D
C0254	B-5D
C0255	B-5D
C0256	B-5D
C0257	B-5D
C0258	A-4E
C0261	B-7H
C0262	B-6F
C0263	A-7C
C0264	A-7C
C0265	A-7C
C0266	A-7C
C0267	B-2D
C0268	B-6E
C0270	A-8C
C0271	A-7C
C0272	A-7C
C0273	B-1D
C0274	B-1D
C0276	B-1D
C0277	B-1D
C0278	B-7H
C0280	B-7G
C0281	A-2G
C0282	A-2G
C0283	A-2H
C0284	B-7I
C0285	B-7I
C0286	B-7H
C0287	B-7H
C0288	A-1G
C0289	A-7C
C0295	B-2D
C0296	B-6D
C0297	B-6D
C0298	B-5E
C0299	A-8C
C0300	B-7H
C0301	A-7C
C0304	B-6C
C0402	B-5F
C0403	B-5F
C0405	B-5F
C0406	B-5G
C0408	B-5F
C0409	B-6F
C0410	B-6F
C0411	A-3F
C0412	A-3F
C0413	B-6F
C0415	B-6F
C0416	B-6G
C0417	B-7B
C0418	B-2I
C0422	B-6G
C0424	B-6G
C0425	B-6G
C0426	B-5G
C0427	B-7H
C0428	B-6I
C0429	B-7I
C0430	A-4G
C0431	B-7I
C0432	B-5G
C0438	B-7C
C0439	B-7C
C0440	B-7C
C0441	B-6B
C0442	B-7C
C0443	B-7C
C0447	B-6C
C0449	B-7D
C0451	B-5F
C0454	B-7B
C0455	B-7C
C0456	B-5F
C0501	B-5I
C0502	B-4I
C0503	B-4H
C0504	B-3H
C0505	B-5H
C0506	B-3H
C0507	B-4I
C0508	B-4H
C0509	A-4I
C0510	B-4H
C0511	B-5I
C0512	B-5H
C0513	B-5I
C0517	A-3I
C0518	A-3I
C0519	A-3I
C0520	B-6I
C0521	A-3H
C0522	A-3H
C0523	A-3H
C0524	A-3H
C0525	A-3I
C0526	A-3I
C0527	B-6I
C0532	B-3I
C0534	B-5H
C0536	B-4H
C0537	B-6H
C0538	B-2E
C0606	B-1E
C0608	A-6F
C0609	A-6F
C0614	A-7G
C0615	B-3F
C0616	B-3F
C0617	B-3F
C0618	B-3F
C0619	A-5G
C0621	B-4F
C0622	A-6F
C0901	B-4D
C0903	A-5D
C0904	B-3D
C0905	B-4D
C0906	A-6E
C0907	A-5E
C0908	A-5B
C0909	B-3E
C0910	A-6E
C0911	A-6E
C0913	A-6E
C0914	B-3F
C0916	B-3E
C0917	A-6F
C0918	A-6F
C0919	A-4E
C0920	A-4E
C0921	A-6F
C0923	B-6G
C0924	B-6G
C0925	B-6A
C0926	B-7A
C0929	B-6A
C0930	A-6E
C0931	A-6F
C0933	A-4F
C0934	A-4F
C0935	A-5F
C0936	B-3G
C0937	B-3G
C0939	B-4D
C0943	B-4F
C0944	B-4C
C0945	A-4D
C0946	B-4C
C0947	B-4D
C0949	B-4C
C0950	B-4D
C0951	B-4E
C0952	B-4E
CN	
CN0201	B-1B
CX	
CX0201	B-5E
CX0901	B-4E
CX0902	A-4E
D	
D0201	B-5F
D0202	A-2H
D0203	A-6D
D0204	B-1D
D0207	B-6D
D0401	A-3G
D0403	A-3F
D0405	B-2H
D0408	B-7C
D0410	B-3I
D0501	B-3I
D0502	A-4I
D0504	A-4I
D0505	A-5G
D0901	B-3C
D0902	A-6C
D0903	A-5E
D0904	A-4C
D0906	B-7A
D0907	B-3E
D0908	A-6B
F	
F0501	A-5J
IC	
IC0201	A-3E
IC0202	A-7C
IC0203	A-2G
IC0204	A-4E
IC0501	A-3H
IC0502	B-4I
IC0901	A-5F
IC0902	A-5D
IC0903	A-6E
IC0904	A-5B
IC0905	A-4D
JK	
JK0401	B-2H
JK0501	B-3J
JK0901	B-6J
L	
L0201	B-6D
L0202	B-6D
L0203	B-5E
L0204	B-6D
L0205	B-5E
L0206	B-7H
L0207	B-6G
L0208	B-7E
L0210	B-6D
L0211	B-2C
L0213	B-1D
L0214	B-2D
L0216	B-6D
L0218	B-6F
L0220	B-6C
L0403	B-6G
L0404	B-7H
L0501	B-4I
L0502	B-4I
L0503	B-4H
L0504	B-4I
L0505	B-5I
L0506	B-5I
L0508	B-5H
L0510	B-2G
L0511	B-4H
L0902	B-3G
L0903	B-4D
LI	
LI0901	B-3C
PG	
PG0201	A-8C
PG0401	B-6B
PG0402	B-5G
PG0403	B-1B
PG0601	B-1E
PG0602	B-2F
PG0603	B-5D
PG0901	B-3D
PG0902	B-6G
PG0903	B-6A
PG0905	B-6A
PG0908	B-7A
PG0909	B-6A
PG0911	B-6A
PG0912	B-2F
Q	
Q0201	A-6C
Q0202	B-6D
Q0203	B-1D
Q0204	B-1D
Q0205	B-2D
Q0206	A-2G
Q0208	A-7C
Q0211	B-6D
Q0212	A-7C
Q0213	A-7C
Q0219	B-6E
Q0401	B-5F
Q0402	A-4G
Q0403	A-3H
Q0404	A-3F
Q0405	B-5G
Q0406	B-6H
Q0407	A-1C
Q0415	A-2B
Q0416	A-2C
Q0419	A-1B
Q0423	B-5G
Q0501	B-4I
Q0502	A-4I
Q0503	B-5I
Q0504	B-3H
Q0507	A-5G
Q0508	B-7I
Q0509	B-7I
Q0511	B-3I
Q0901	A-6D
Q0902	A-5D
Q0903	A-5E
Q0904	A-6E
Q0905	A-6D
Q0906	A-2I
Q0907	A-4F
R	
R0205	B-5E
R0207	B-5F
R0211	A-6C
R0212	B-7G
R0213	B-7G
R0214	B-6E
R0217	B-7E
R0218	A-2D
R0219	B-7E
R0220	B-7E
R0221	A-2D
R0222	A-2D
R0228	B-6C
R0229	A-7C
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R0233	B-2D
R0234	A-7C
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R0246	B-7H
R0247	B-2C
R0249	B-7H
R0250	B-5E
R0251	B-2G
R0253	B-6E
R0254	B-6E
R0257	B-2C
R0259	A-7C
R0260	B-7G
R0261	B-8H
R0262	A-2G
R0264	B-7I
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R0267	A-7C
R0269	B-6C
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R0276	B-6E
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R0407	B-5G
R0408	B-5F
R0409	B-6F
R0410	B-6F
R0411	B-6F
R0412	A-3F
R0413	A-3G
R0414	A-2G
R0415	B-6F
R0416	B-6F
R0417	B-6F
R0418	B-6G
R0420	B-7B
R0421	B-8C
R0422	B-7B
R0423	A-1B
R0425	B-7D
R0428	A-3G
R0429	A-3F
R0430	B-6G
R0434	B-5G
R0436	B-7I
R0440	B-8D
R0443	B-6F
R0448	B-7C
R0449	B-8C
R0450	B-8C
R0451	B-8C
R0453	B-7B
R0454	B-7B
R0458	B-7C
R0459	A-2C
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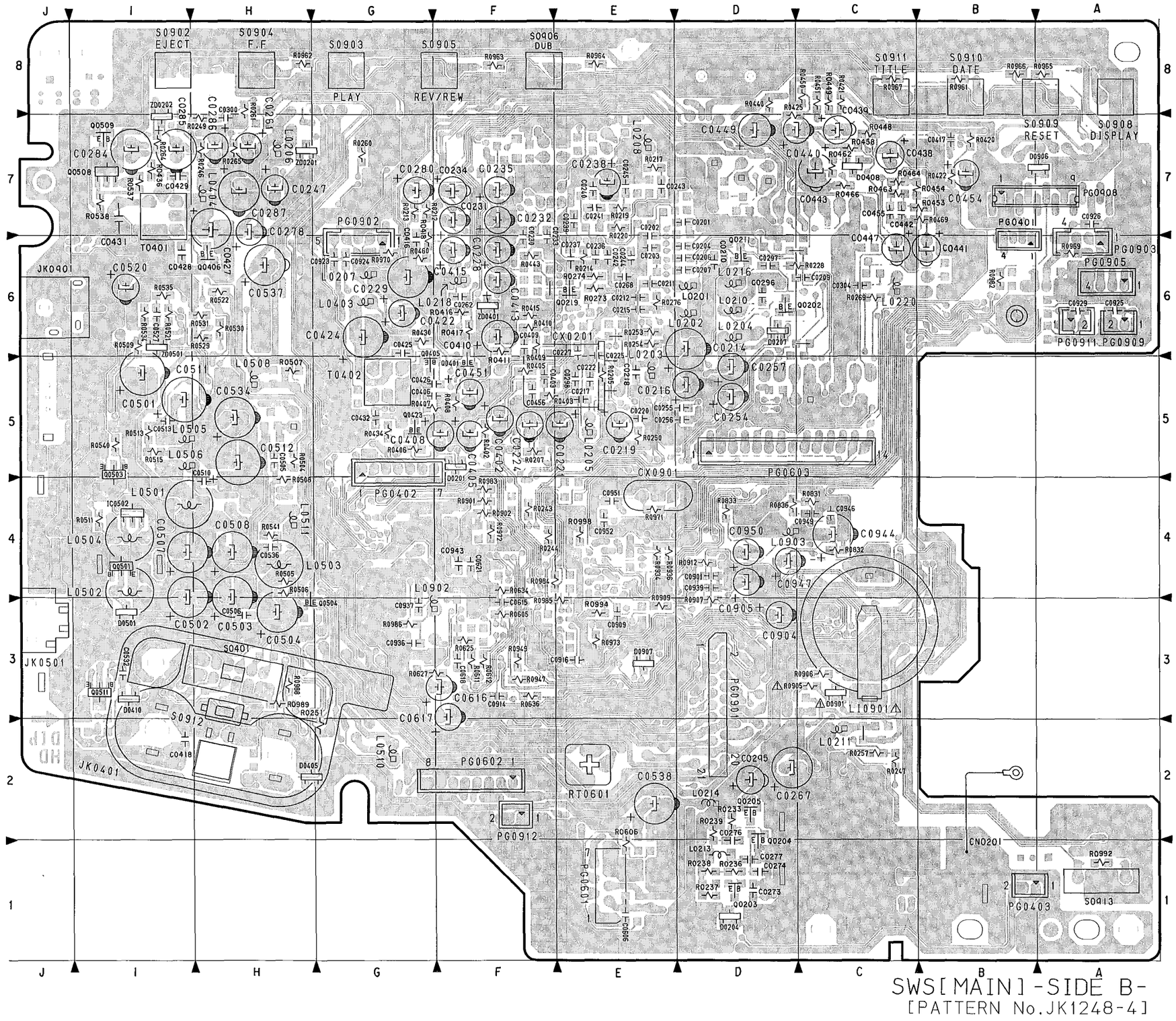
R0462	B-7C
R0463	B-7C
R0464	B-7C
R0465	A-2C
R0466	B-7C
R0469	B-7B
R0503	A-3H
R0504	B-5H
R0505	B-4H
R0506	B-4H
R0507	B-5H
R0508	B-5H
R0509	B-6I
R0511	B-4I
R0513	B-5I
R0515	B-5I
R0517	A-3H
R0518	A-3H
R0520	A-3H
R0521	B-6I
R0522	B-6H
R0524	A-3H
R0525	A-3H
R0526	A-3H
R0527	A-3H
R0528	A-3H
R0529	B-6H
R0530	B-6H
R0531	B-6H
R0534	B-6I
R0535	B-6I
R0536	A-3I
R0537	B-7I
R0538	B-7I
R0540	B-5I
R0541	B-4H
R0543	A-5G
R0605	B-3F
R0606	B-1E
R0611	B-3F
R0612	B-3F
R0625	B-3F
R0627	B-3F
R0628	A-5G
R0629	A-5G
R0630	A-6F
R0632	A-7F
R0634	B-4F
R0636	B-3F
R0831	B-4C
R0832	B-4C
R0833	B-4D
R0836	B-4D
R0901	B-4F
R0902	B-4F
R0903	A-6D
R0904	A-6D
R0905	B-3C
R0906	B-3C
R0907	B-4D
R0908	A-5D
R0909	B-3E
R0910	A-6E
R0912	B-4D
R0913	A-5E
R0914	A-6E
R0915	A-5E
R0921	A-5D
R0925	A-5E
R0926	A-5E
R0933	A-5E
R0934	B-4E
R0936	B-4E
R0939	A-6E
R0940	A-6E
R0942	A-6E
R0943	A-6E
R0944	A-6E
R0945	A-6E
R0946	A-6F
R0947	B-3F
R0948	A-6E
R0949	B-3F
R0950	A-6E
R0951	A-6E
R0952	A-7D
R0953	A-7D
R0955	A-6D
R0960	A-5B
R0961	B-8B
R0962	B-8H
R0963	B-8F
R0964	B-8E
R0965	B-8A
R0966	B-8B
R0967	B-8C
R0968	A-5F
R0969	B-6A
R0970	B-6G
R0971	B-4E
R0972	B-4F
R0973	B-3E
R0975	A-4F
R0976	A-5F

SWS [MAIN] 2/2

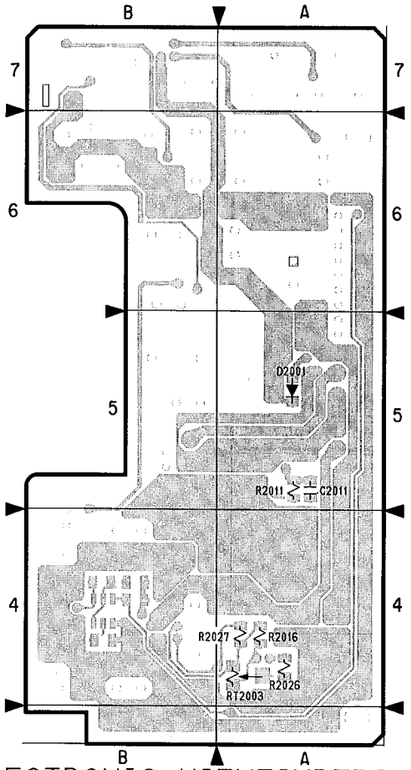
Symbol No	Parts Location
R0977	A-5F
R0978	A-4F
R0979	A-5F
R0980	A-4F
R0981	A-4F
R0982	B-6B
R0983	B-4F
R0984	B-4F
R0985	B-3E
R0986	B-3G
R0988	B-3H
R0989	B-3H
R0990	A-3J
R0991	A-3J
R0992	B-1A
R0993	A-6E
R0994	B-3E
R0996	A-6E
R0998	B-4E
RT	
RT0601	B-2E
S	
S0401	B-3H
S0901	A-1D
S0902	B-8I
S0903	B-8G
S0904	B-8H
S0905	B-8F
S0906	B-8F
S0907	A-7A
S0908	B-8A
S0909	B-8A
S0910	B-8B
S0911	B-8C
S0912	B-3H
S0913	B-1A
T	
T0201	A-6I
T0401	B-7I
T0402	B-5G
T0502	A-4I
T0503	A-4I
TP	
TP0201	A-4D
TP0202	A-6C
ZD	
ZD0201	B-7H
ZD0202	B-8I
ZD0401	B-6F
ZD0501	B-6I
ZD0901	A-6B

SWS CIRCUIT BOARD – SIDE B –

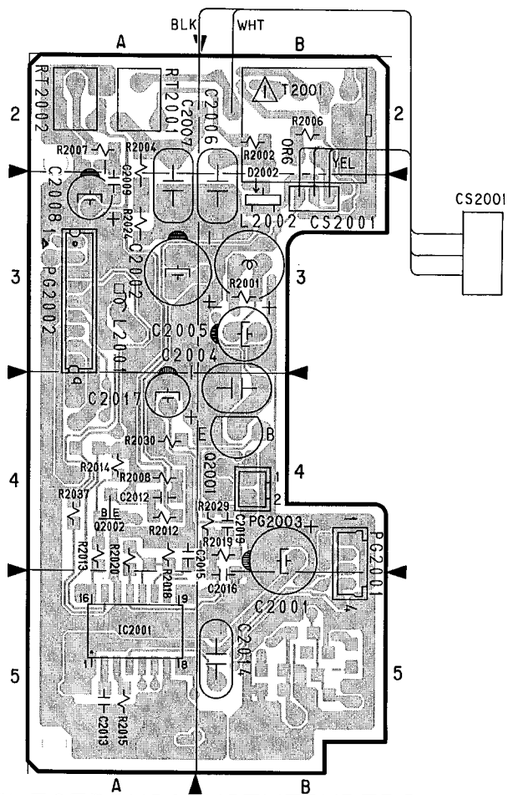


SWS[MAIN]-SIDE B-
[PATTERN No.JK1248-4]

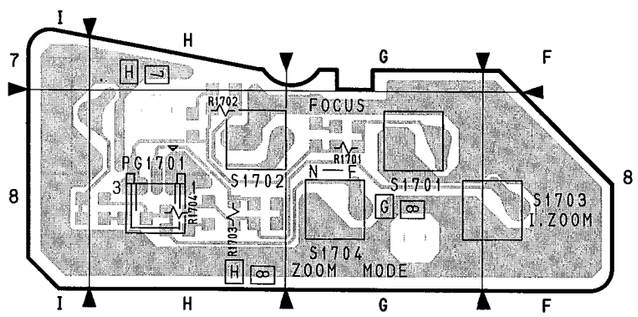
EVF, CON CIRCUIT BOARD



EVF[ELECTRONIC VIEWFINDER]
-SIDE A-
[PATTERN No.JK1248-4]



EVF[ELECTRONIC VIEWFINDER]
-SIDE B-
[PATTERN No.JK1248-4]



CON[CONTROL]
[PATTERN No.JK1248-4]

IDENTIFICATION OF PARTS LOCATION

EVF [ELECTRONIC VIEWFINDER]

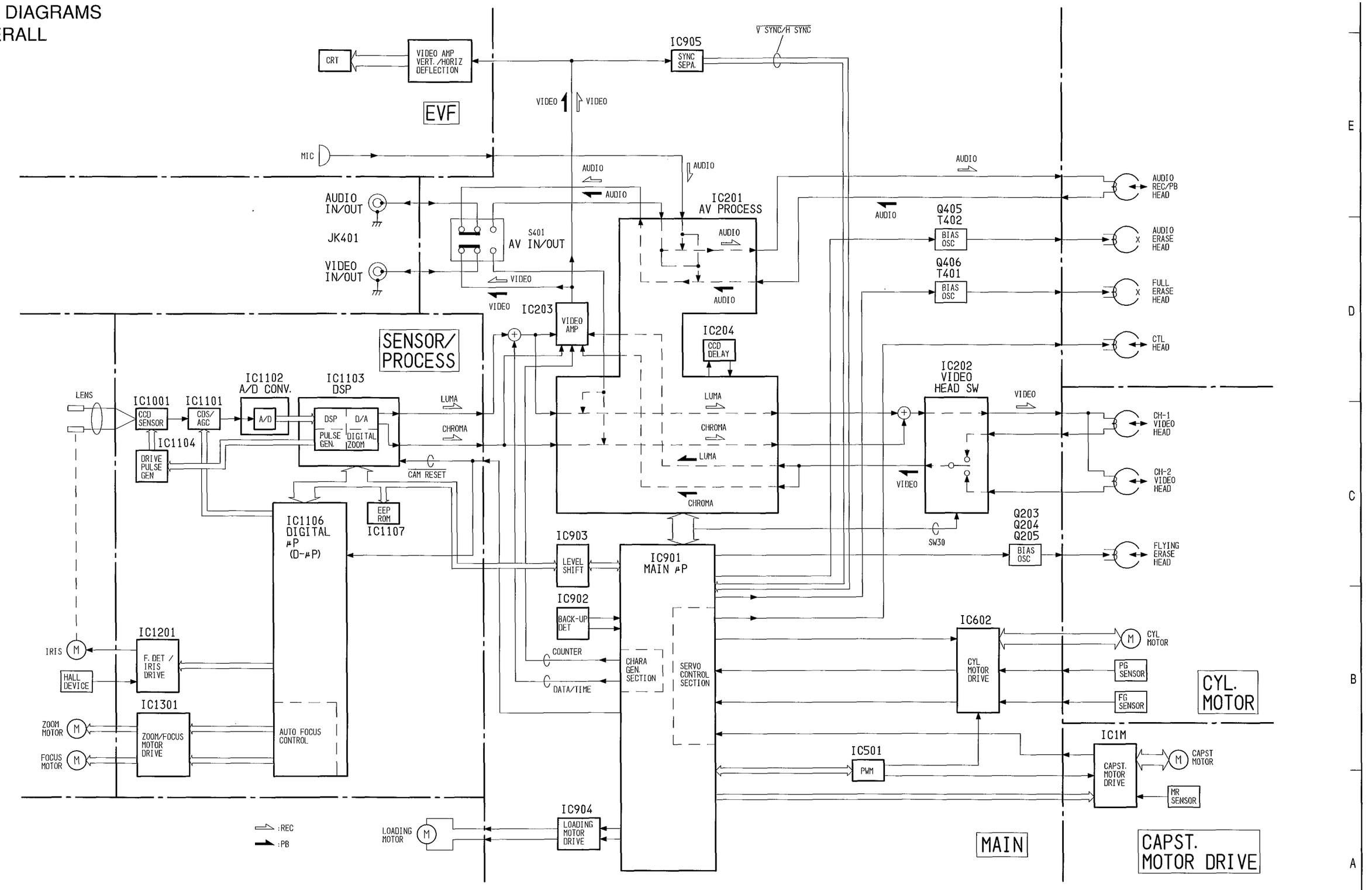
Symbol No	Parts Location
C	
C2001	B-4B
C2002	B-3A
C2004	B-4B
C2005	B-3B
C2006	B-3B
C2007	B-3A
C2008	B-3A
C2009	B-3A
C2011	A-5A
C2012	B-4A
C2013	B-5A
C2014	B-5B
C2015	B-4A
C2016	B-5B
C2017	B-4A
C2019	B-4B
CS	
CS2001	B-3B
D	
D2001	A-5A
D2002	B-3B
IC	
IC2001	B-5A
L	
L2001	B-3A
L2002	B-3B
PG	
PG2001	B-4B
PG2002	B-3A
PG2003	B-4B
Q	
Q2001	B-4B
Q2002	B-4A
R	
R2001	B-3B
R2002	B-2B
R2004	B-2A
R2006	B-2B
R2007	B-2A
R2008	B-4A
R2011	A-5A
R2012	B-4A
R2013	B-4A
R2014	B-4A
R2015	B-5A
R2016	A-4A
R2018	B-4A
R2019	B-4B
R2020	B-4A
R2024	B-3A
R2026	A-4A
R2027	A-4A
R2029	B-4B
R2030	B-4A
R2037	B-4A
RT	
RT2001	B-2A

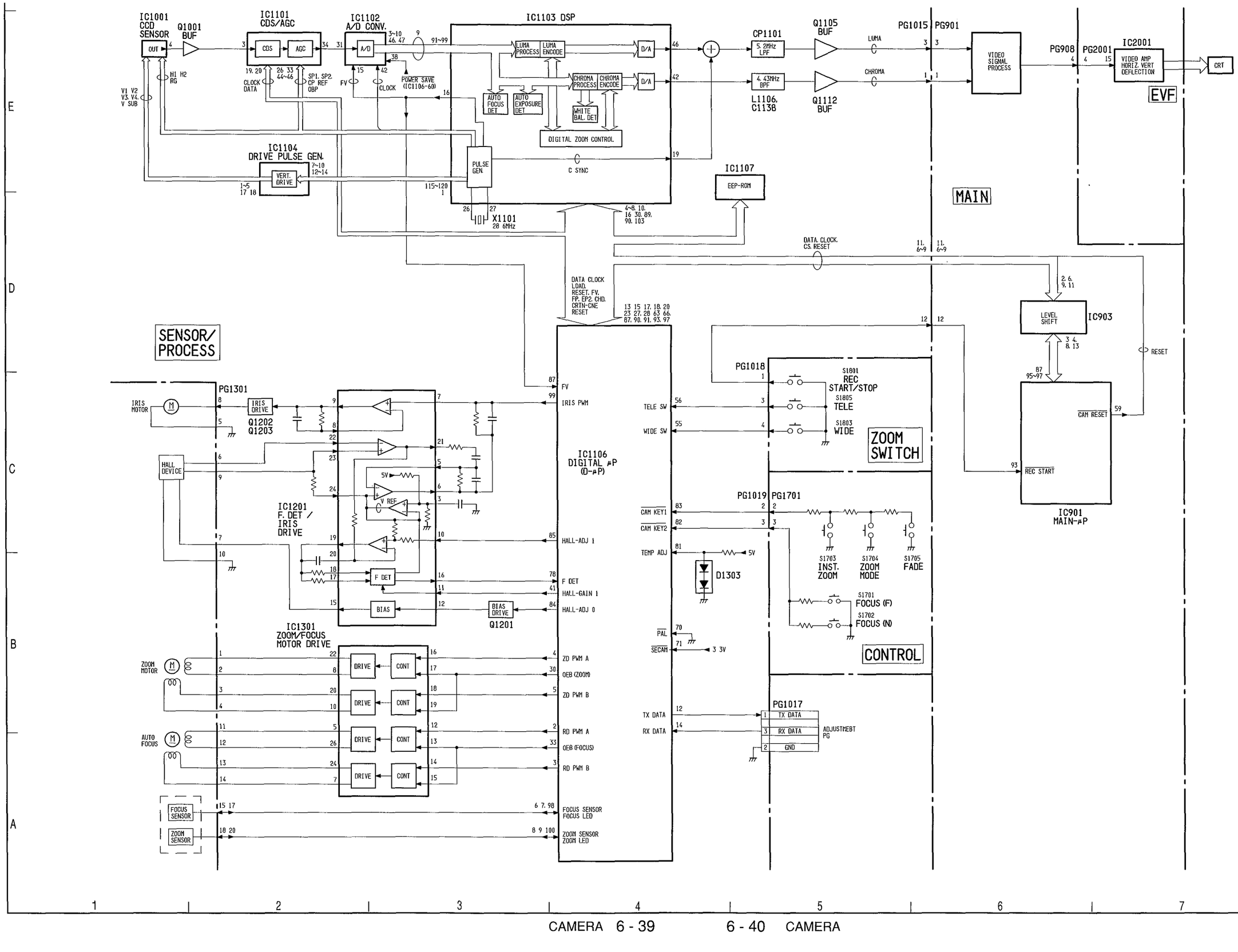
CON [CONTROL]

Symbol No	Parts Location
PG	
PG1701	8H
R	
R1701	8G
R1702	8H
R1703	8H
R1704	8H
S	
S1701	8G
S1702	8H
S1703	8F
S1704	8G

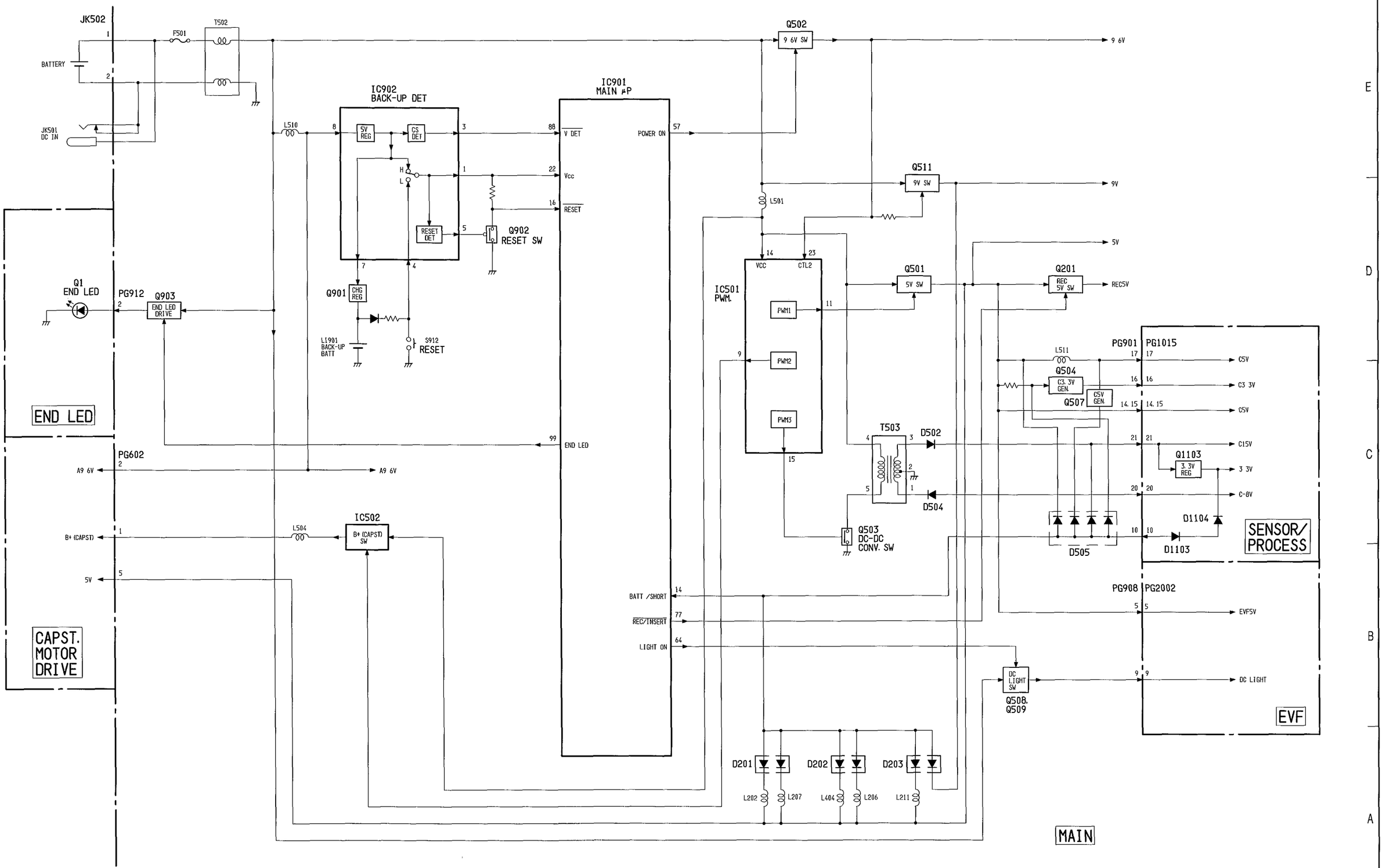
Symbol No	Parts Location
RT2002	B-2A
RT2003	A-4A
T	
T2001	B-2B

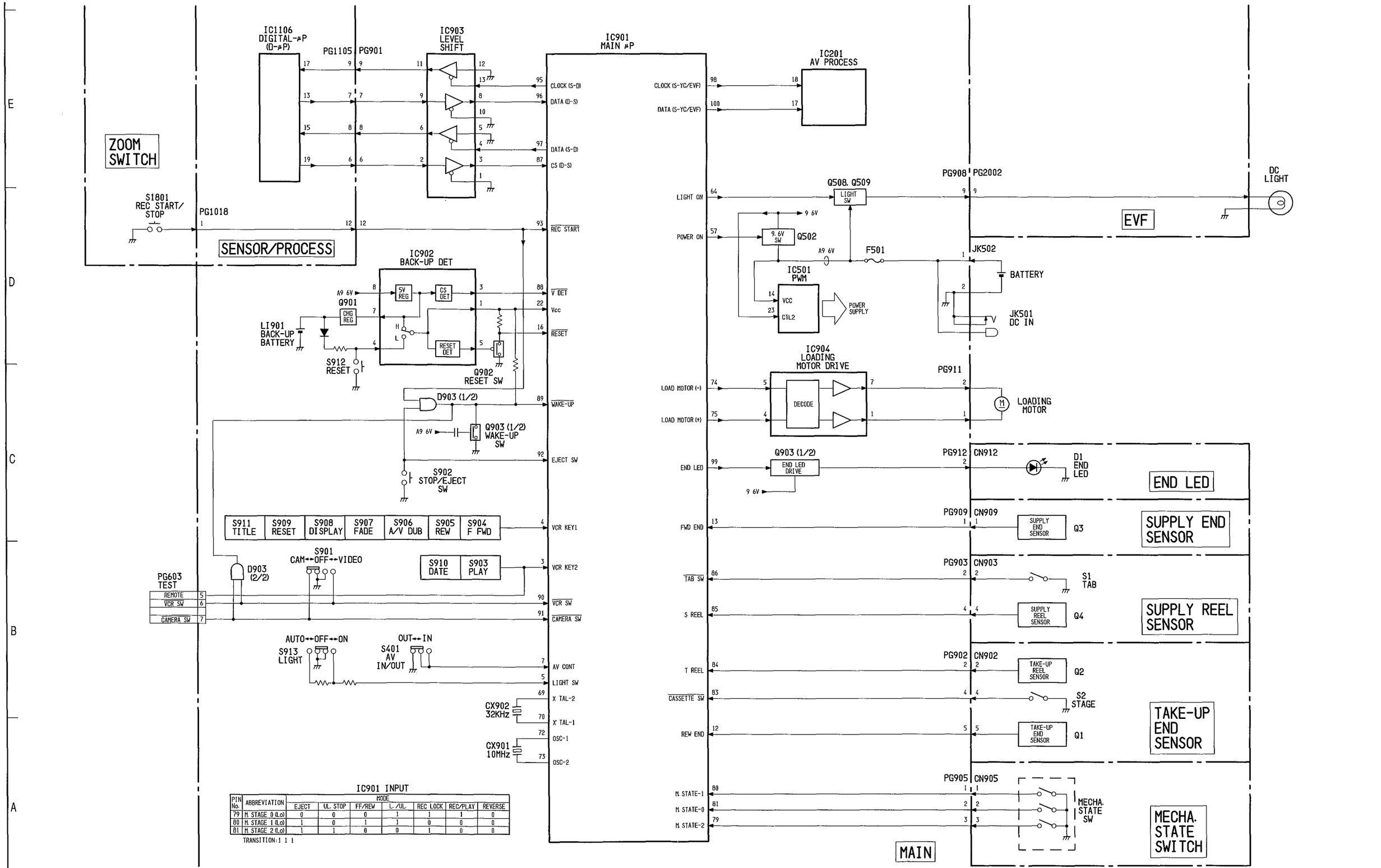
BLOCK DIAGRAMS
1. OVERALL




IC1001 CCD SENSOR
Q1001 BUF
IC1101 CDS/AGC
IC1102 A/D CONV.
IC1103 DSP
LUMA PROCESS
LUMA ENCODE
CHROMA PROCESS
CHROMA ENCODE
AUTO FOCUS DET
AUTO EXPOSURE DET
WHITE BAL. DET
DIGITAL ZOOM CONTROL
D/A
CP1101
5.2MHz LPF
4.43MHz BPF
L1106, C1138
Q1105 BUF
Q1112 BUF
LUMA
CHROMA
PG1015 PG901
VIDEO SIGNAL PROCESS
PG908 PG2001
IC2001
VIDEO AMP HORIZ. VERT DEFLECTION
CRT
EVF
MAIN
IC1104 DRIVE PULSE GEN.
VERT. DRIVE
PULSE GEN.
C SYNC
X1101 28.6MHz
IC1107 EEP-ROM
DATA. CLOCK. CS. RESET
DATA CLOCK LOAD. RESET. FV. FP. EP2. CHD. CRTN-CNE RESET
LEVEL SHIFT
IC903
RESET
CAM RESET
REC START
IC901 MAIN-μP
SENSOR/ PROCESS
PG1301
IRIS MOTOR
IRIS DRIVE
Q1202 Q1203
HALL DEVICE
IC1201 F. DET / IRIS DRIVE
V REF
F DET
BIAS
BIAS DRIVE
Q1201
IC1301 ZOOM/FOCUS MOTOR DRIVE
DRIVE
CONT
ZOOM MOTOR
AUTO FOCUS
FOCUS SENSOR
ZOOM SENSOR
FV
IRIS PWM
HALL-ADJ 1
F DET
HALL-GAIN 1
HALL-ADJ 0
ZD PWM A
OEB (ZOOM)
ZD PWM B
RD PWM A
OEB (FOCUS)
RD PWM B
FOCUS SENSOR
FOCUS LED
ZOOM SENSOR
ZOOM LED
IC1106 DIGITAL μP (D-μP)
TELE SW
WIDE SW
PG1018
S1801 REC START/STOP
S1805 TELE
S1803 WIDE
ZOOM SWITCH
PG1019 PG1701
CAM KEY1
CAM KEY2
TEMP ADJ
D1303
S1703 INST. ZOOM
S1704 ZOOM MODE
S1705 FADE
S1701 FOCUS (F)
S1702 FOCUS (N)
PAL
SECAM
3.3V
CONTROL
PG1017
TX DATA
RX DATA
GND
ADJUSTMEBT PG

3. POWER

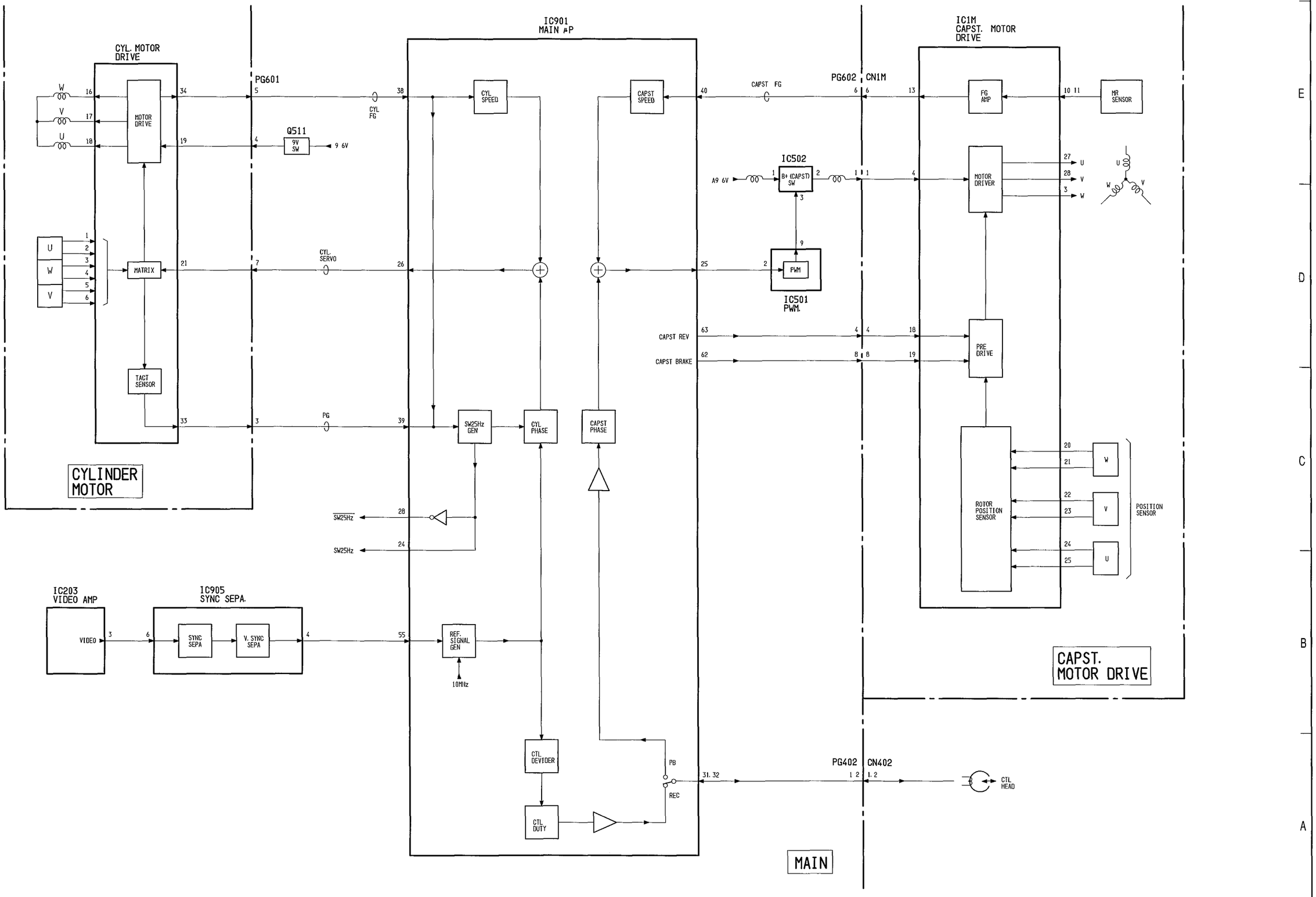

JK502
BATTERY
JK501
DC IN
F501
T502
L510
IC902
BACK-UP DET
5V REG
CS DET
RESET DET
H
L
Q902
RESET SW
Q901
CHG REG
L1901
BACK-UP BATT
S912
RESET
IC901
MAIN μP
POWER ON
V DET
Vcc
RESET
END LED
Q502
9 6V SW
9 6V
Q511
9V SW
9V
L501
5V
Q501
5V SW
Q201
REC 5V SW
REC5V
IC501
PWM
VCC
CTL2
PWM1
PWM2
PWM3
T503
D502
D504
Q503
DC-DC CONV. SW
Q1
END LED
PG912
Q903
END LED DRIVE
END LED
PG602
A9 6V
A9 6V
IC502
B+ (CAPST) SW
L504
B+ (CAPST)
5V
CAPST. MOTOR DRIVE
BATT /SHORT
REC/INSERT
LIGHT ON
D201
D202
D203
L202
L207
L404
L206
L211
PG901
PG1015
L511
Q504
C3.3V GEN.
Q507
C5V GEN.
C5V
C3.3V
C15V
Q1103
3.3V REG
3.3V
C-8V
D1104
D1103
D505
SENSOR/ PROCESS
PG908
PG2002
EVF5V
DC LIGHT SW
Q508, Q509
DC LIGHT
EVF
MAIN

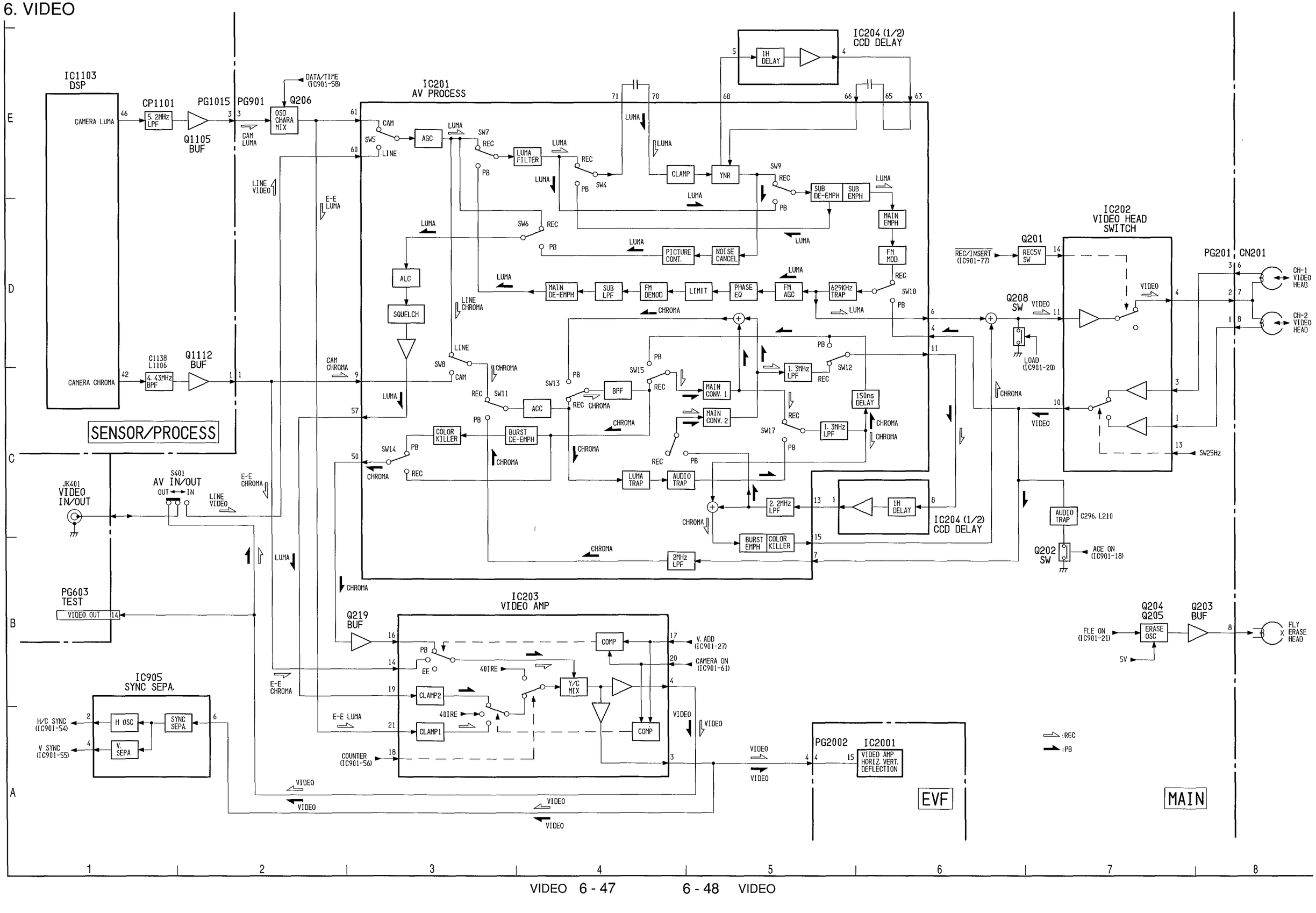


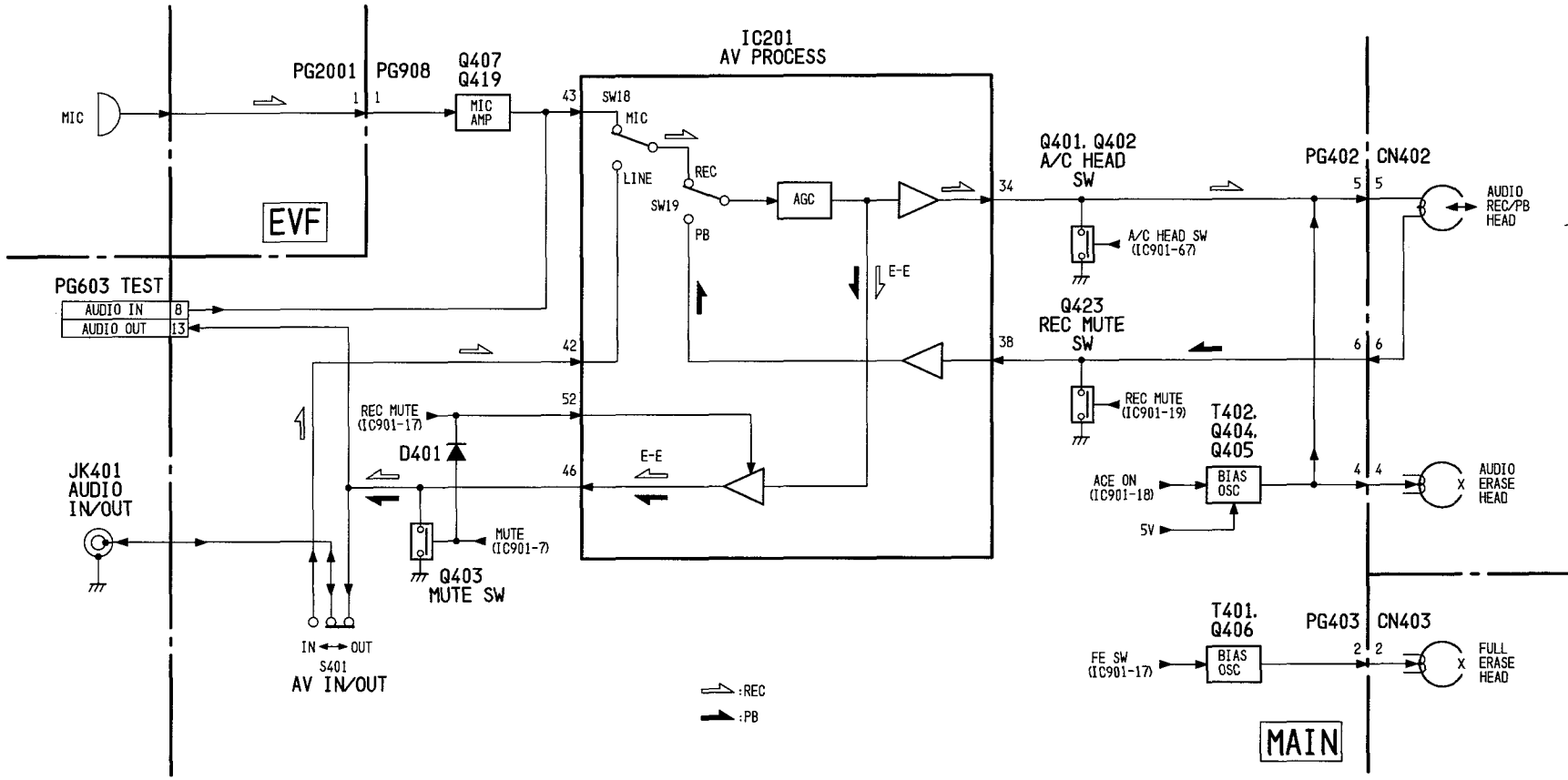
IC901 INPUT

PIN No.	ABBREVIATION	MODE						
		EJECT	UL. STOP	FF/REW	L./UL.	REC LOCK	REC/PLAY	REVERSE
79	M STAGE 0 (L.o)	0	0	0	1	1	1	0
80	M STAGE 1 (L.o)	1	0	1	1	0	0	0
81	M STAGE 2 (L.o)	1	1	0	0	1	0	0

TRANSITION: 1 1 1


CYL. MOTOR DRIVE
W
V
U
16
17
18
MOTOR DRIVE
34
19
PG601
5
4
Q511
9V SW
9 6V
CYL FG
38
IC901 MAIN μP
CYL SPEED
CAPST SPEED
40
CAPST FG
PG602
6
CN1M
IC1M CAPST. MOTOR DRIVE
13
FG AMP
10 11
MR SENSOR
IC502
A9 6V
1
B+ (CAPST) SW
2
3
1
4
MOTOR DRIVER
27
28
3
U
V
W
9
2
PWM
IC501 PWM.
U
W
V
1
2
3
4
5
6
MATRIX
21
7
CYL. SERVO
26
25
TACT SENSOR
CAPST REV
CAPST BRAKE
63
62
4
8
18
19
PRE DRIVE
33
3
PG
39
SW25Hz GEN
CYL PHASE
CAPST PHASE
20
21
22
23
24
25
W
V
U
ROTOR POSITION SENSOR
POSITION SENSOR
CYLINDER MOTOR
SW25Hz
28
24
IC203 VIDEO AMP
VIDEO
3
IC905 SYNC SEPA.
6
SYNC SEPA
V. SYNC SEPA
4
55
REF. SIGNAL GEN
10MHz
CAPST. MOTOR DRIVE
CTL DEVIDER
CTL DUTY
PB
REC
31. 32
PG402
CN402
1 2
1. 2
CTL HEAD
MAIN


IC1103
DSP
CAMERA LUMA
CAMERA CHROMA
CP1101
5.2MHz LPF
PG1015
Q1105
BUF
PG901
DATA/TIME (IC901-58)
Q206
OSD CHARA MIX
CAM LUMA
LINE VIDEO
E-E LUMA
C1138
L1106
4.43MHz BPF
Q1112
BUF
CAM CHROMA
SENSOR/PROCESS
IC201
AV PROCESS
IC204 (1/2)
CCD DELAY
1H DELAY
CAM
LINE
SW5
AGC
SW7
REC
PB
LUMA FILTER
SW4
CLAMP
YNR
SW9
SUB DE-EMPH
SUB EMPH
MAIN EMPH
FM MOD.
SW6
PICTURE CONT.
NOISE CANCEL
ALC
SQUELCH
MAIN DE-EMPH
SUB LPF
FM DEMOD
LIMIT
PHASE EQ
FM AGC
629KHz TRAP
SW10
LINE CHROMA
SW8
CHROMA
SW11
ACC
SW13
BPF
SW15
MAIN CONV. 1
MAIN CONV. 2
1.3MHz LPF
SW12
150ns DELAY
SW17
COLOR KILLER
BURST DE-EMPH
SW14
LUMA TRAP
AUDIO TRAP
2.2MHz LPF
BURST EMPH
2MHz LPF
IC202
VIDEO HEAD SWITCH
Q201
REC/INSERT (IC901-77)
REC5V SW
PG201, CN201
CH-1 VIDEO HEAD
CH-2 VIDEO HEAD
Q208
SW
LOAD (IC901-20)
SW25Hz
AUDIO TRAP C296, L210
Q202
SW
ACE ON (IC901-18)
JK401
VIDEO IN/OUT
S401
AV IN/OUT
OUT IN
E-E CHROMA
LINE VIDEO
PG603
TEST
VIDEO OUT
IC203
VIDEO AMP
Q219
BUF
COMP
PB
EE
40IRE
CLAMP2
CLAMP1
Y/C MIX
V. ADD (IC901-27)
CAMERA ON (IC901-61)
COUNTER (IC901-56)
IC905
SYNC SEPA.
H/C SYNC (IC901-54)
V SYNC (IC901-55)
H OSC
SYNC SEPA.
V. SEPA
Q204
Q205
ERASE OSC
Q203
BUF
FLE ON (IC901-21)
5V
FLY ERASE HEAD
PG2002
IC2001
VIDEO AMP HORIZ. VERT. DEFLECTION
:REC
:PB
EVF
MAIN


IC201
AV PROCESS
PG2001
PG908
Q407
Q419
MIC
MIC AMP
EVF
SW18
LINE
REC
SW19
PB
AGC
E-E
Q401. Q402
A/C HEAD
SW
A/C HEAD SW
(IC901-67)
PG402
CN402
AUDIO
REC/PB
HEAD
PG603 TEST
AUDIO IN
AUDIO OUT
Q423
REC MUTE
SW
REC MUTE
(IC901-19)
REC MUTE
(IC901-17)
D401
T402.
Q404.
Q405
ACE ON
(IC901-18)
BIAS
OSC
5V
AUDIO
ERASE
HEAD
JK401
AUDIO
IN/OUT
MUTE
(IC901-7)
Q403
MUTE SW
IN
OUT
S401
AV IN/OUT
T401.
Q406
FE SW
(IC901-17)
PG403
CN403
FULL
ERASE
HEAD
:REC
:PB
MAIN

MICROPROCESSOR PIN FUNCTION TABLES

1. DIGITAL MICROPROCESSOR (IC1106: D-μP)

Pin No.	I/O	Active Level	Abbreviation	Function
1	-----	-----	Vcc	3.3V power input.
2	O	(Pulse)	RD PWM A	Outputs reference PWM pulses to IC1301 (ZOOM/FOCUS MOTOR DRIVE).
3	O	(Pulse)	RD PWM B	
4	O	(Pulse)	ZD PWM A	Outputs reference PWM pulses to IC1301 (ZOOM/FOCUS MOTOR DRIVE).
5	O	(Pulse)	ZD PWM B	
6	O	(Pulse)	FOCUS LED1	Output pulses to drive the LEDs in the focus reset switches (FOCUS RESET SW).
7	O	(Pulse)	FOCUS LED2	
8	O	(Pulse)	ZOOM LED1	Output pulses to drive the LEDs in the zoom reset switches (ZOOM RESET SW).
9	O	(Pulse)	ZOOM LED2	
10	-----	-----	RESET[Lo]	Not used. Open.
11	-----	-----	Vss	Ground.
12	O	(Pulse)	TX DATA(SD)	Used for initial settings and adjustment. For data communications with personal computer.
14	I	(Pulse)	RX DATA(RD)	
13	O	(Pulse)	DATA(D-DSP/ ROM/S)	For data communications with IC1102 (DSP), IC1107 (EEP-ROM) and IC901 (MAIN-μP).
15	I	(Pulse)	DATA(DSP/ ROM/S-D)	
17	O	(Pulse)	CLOCK(D-DSP/ ROM/S)	
16	-----	-----	-----	Not used. Open.
18	O	Lo	LOAD[Lo] (D-DSP)	Activates data communications with IC1102 (DSP).
19	O	Lo	CS-MB[Lo]	Activates data communications with IC901 (MAIN-μP).
20	O	(Pulse)	CS-MA	Activates data communications with IC901 (MAIN-μP).
21	-----	-----	-----	Not used. Open.
22	-----	-----	Vss	Ground.
23	-----	-----	LOAD[Lo] (D-ROM)	Activates data communications with IC1107 (EEP-ROM).
24	-----	-----	-----	Not used. Open.
25	-----	-----	-----	
26	-----	-----	-----	
27	O	(Pulse)	CLOCK(D-CDS)	Transfer data to IC1101 (CDS/AGC).
28	O	(Pulse)	DATA(D-CDS)	
29	-----	-----	-----	Not used. Open.
30	O	(Pulse)	OEB(ZOOM)	Activates data communications with IC1301 (ZOOM MOTOR DRIVE).
31	-----	-----	-----	Not used. Open.
32	-----	-----	-----	
33	O	(Pulse)	OEB(FOCUS)	Activates data communications with IC1302 (FOCUS MOTOR DRIVE).
34	-----	-----	-----	Not used. Open.
35	-----	-----	Vcc	3.3V power input.
36	-----	-----	-----	Not used. Open.
37	O	Hi	TALLY	
38	O	Hi	RESET V.GYRO	
39	O	Hi	RESET H.GYRO	
40	O	Hi	HALL GAIN 0	
41	O	Hi	HALL GAIN 1	Control the amplification (gain of hall device) in IC1201 (F.DET/IRIS DRIVE).
42	-----	-----	-----	Not used. Open.
43	-----	-----	-----	
44	-----	-----	Vss	Ground.
45	-----	-----	-----	Not used. Open.
46	-----	-----	-----	
47	-----	-----	-----	
48	-----	-----	-----	
49	-----	-----	-----	
50	-----	-----	-----	

Pin No.	I/O	Active Level	Abbreviation	Function
51	-----	-----	-----	Not used. Open.
52	-----	-----	-----	
53	-----	-----	-----	
54	I	Lo	T/W FAST	Low-speed zoom detection input.
55	I	Lo	WIDE SW[Lo]	Zoom switch detection inputs.
56	I	Lo	TELE SW[Lo]	
57	-----	-----	Vss	Ground.
58	-----	-----	-----	Not used. Open.
59	-----	-----	-----	
60	O	Lo	POWER SAVE [Lo]	Outputs "Lo" in modes other than camera recording to inhibit the operation of each circuit, thus reducing the power consumption.
61	-----	-----	-----	Not used. Open.
62	I	Hi	STAND-BY[Lo]	Not used. Connected to 3.3V power supply.
63	I	Hi/Lo	RESET	Reset signal input from IC901 (MAIN-μP).
64	I	Hi	MN[Lo]	Not used. Connected to 3.3V power supply.
65	-----	-----	Vss	Ground.
66	I	(Pulse)	CLOCK	Clock pulse input from IC1102 (DSP).
67	-----	-----	-----	Not used. Open.
68	-----	-----	Vcc	3.3V power input.
69	O	Hi	SECAM SW	Not used. Open.
70	I	Hi	PAL[Lo]	Microprocessor internal mode select input. Connected to ground.
71	I	Hi	SECAM[Lo]	Not used. Connected to 3.3V power supply.
72	I	Hi	Hi-BAND	
73	I	Lo	MO0	Not used. Ground.
74	I	Hi	MO1	Not used. Connected to 3.3V power supply.
75	I	Hi	MO2	
76	-----	-----	AVcc	5V power input (for analog circuits in microprocessor).
77	-----	-----	V.REF	A/D reference voltage input (connected to 5V power supply).
78	I	0V-5V	F.DET	F-value detection input. Receives the F.DET voltage detected by IC1202 (F.DET) and compares this with the reference voltage input via pin 77 to detect the F-value.
79	I	0V-5V	V.MOVE	Not used. Ground
80	I	0V-5V	H.MOVE	
81	I	0V-5V	TEMP-ADJ.	Temperature change detection input. Detects variations in the forward voltage at the connected diode to correct the back-focus.
82	I	0V-5V	CAM KEY2	Camera switch detection input (DC Light).
83	I	0V-5V	CAM KEY1	Camera switch detection input (fade, cinema mode, instant zoom).
84	O	0V-5V	HALL-ADJ.0	Drives Q1201 (HALL BIAS) to control the bias voltage of the Hall devices.
85	O	0V-5V	HALL-ADJ.1	Controls the offset voltage of IC1201 (F. DET/IRIS DRIVE).
86	-----	-----	AVss	Ground.
87	I	(Pulse)	FV	Receives the vertical sync pulses that detect the iris detection area, from IC1102 (DSP).
90	I	(Pulse)	FP	Field discrimination pulse input.
91	I	(Pulse)	EP2	Receives pulses which discriminate the iris detection area.
93	I	(Pulse)	CHD	Horizontal sync input.
88	I	Lo	NEAR-SW[Lo]	Not used. Connect to 3.3V power supply.
89	I	Lo	FAR-SW[Lo]	
92	-----	-----	Vss	Ground.
94	-----	-----	-----	Not used. Open.
95	-----	-----	-----	
96	-----	-----	-----	
97	O	(Pulse)	CRTN-CNE	Supplies pulses to IC1102 (DSP) to control the wipe fade operation.
98	I	(Pulse)	FOCUS SENSOR	Focus motor position detection input.
99	O	(Pulse)	IRIS PWM	Iris motor drive output.
100	I	(Pulse)	ZOOM SENSOR	Zoom motor position detection input.

2. MAIN MICROPROCESSOR (IC901: MAIN-μP)

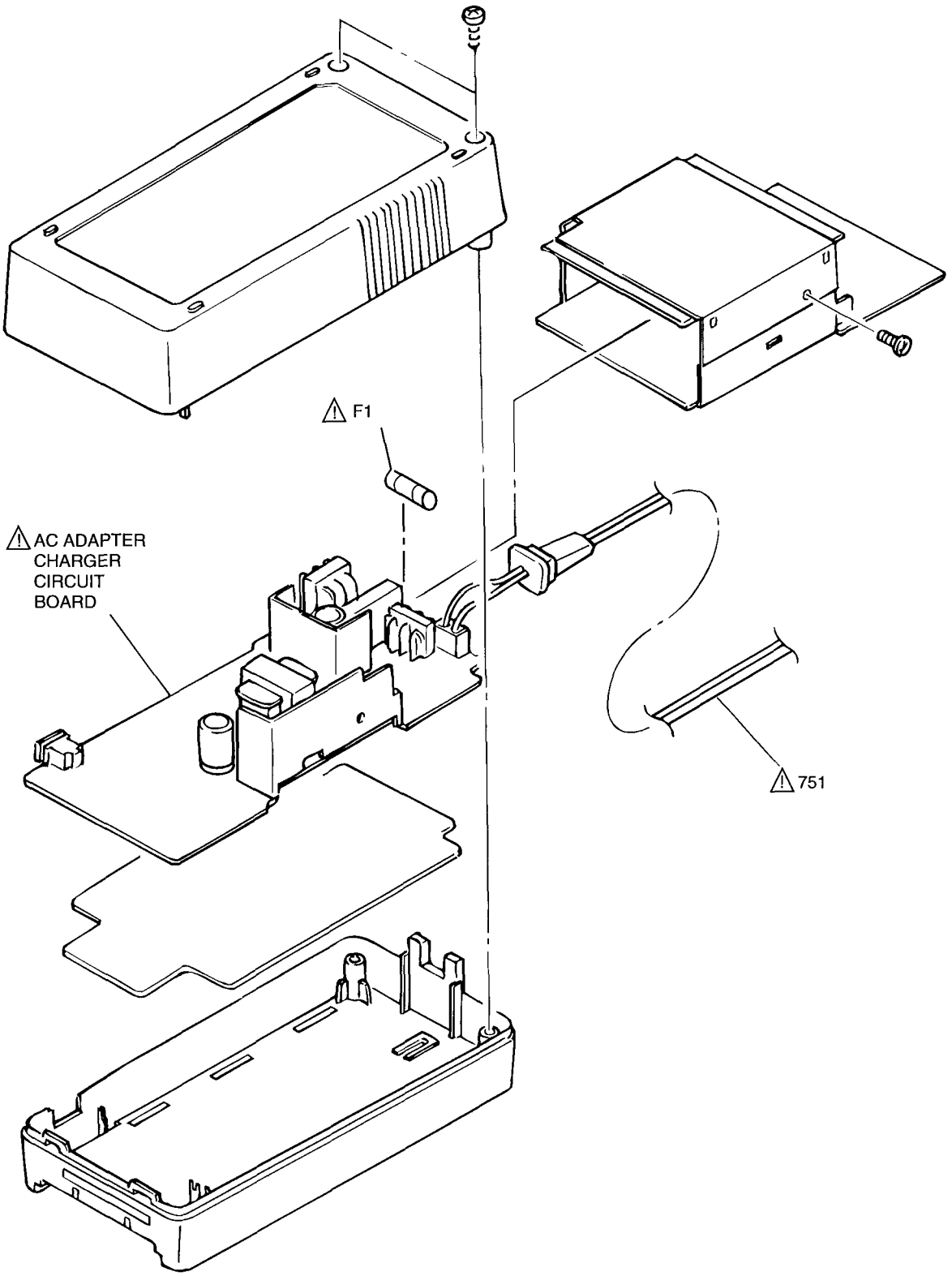
Pin No.	I/O	Active Level	Abbreviation	Function
1	O	(Pulse)	CS(S-EVF)	Not used. Open.
98	O	(Pulse)	CLOCKS-YC/ EVF)	
100	O	(Pulse)	DATA(S-YC/ EVF)	
2	-----	-----	GND	Grounded.
3	I	0V-5V	VCR KEY-1	Detect the key operations using the analog-to-digital conversion.
4	I	0V-5V	VCR KEY-2	
5	I	0V-5V	LIGHT SW	Detects the position of the LIGHT switch.
6	I	0V-5V	S-LOCK+ S-EDIT	Switches the search lock/non-lock and synchro edit functions.
7	I	Hi	AV CONT.	Detects the position of the AV IN/OUT switch.
8	I	Hi/Lo	PAL[Lo]/SECAM	Michroprocessor internal mode select input. Connected to ground via resistor.
9	O	Hi/Lo	PAL[Lo]/ MESECAM	Mode select signal output. Output the "Lo" signal.
10	-----	-----	-----	
11	I	0V-5V	SW POINT	For the connection of a variable resistor that adjusts the head switching point.
12	I	Lo	REW END[Lo]	Detects the tape end during rewind and rewind search modes.
13	I	Lo	FWD END[Lo]	Detects the tape end during record,playback,fast forward and forward search modes.
14	I	0V-5V	BATT/SHORT	Detects the battery remaining levels to display it in the EVF and detects the short-circuit of the power supplies.
15	-----	-----	Vcc	Connected to 5V.
16	I	Lo	RESET[Lo]	Input to reset the main microprocessor. When "Lo" is applied, the main microprocessor is initialized.
17	O	Hi	FE SW	Activates the full erase head.
18	O	Hi	A/C ERASE	Activates the erase head on the audio/control head.
19	O	Hi	REC MUTE	Mutes the audio signal during modes other than play.
20	O	Hi	LOAD	Stops the recording of the video signal.
21	O	Hi	FLE ON	Turns the flying erase head on for 5 seconds when the PAUSE switch is pressed during recording.
22	-----	-----	Vcc	Connected to 5V.
23	-----	-----	-----	Nout used. Open.
24	O	(Pulse)	SW30/25Hz	Head switching pulse output.
25	O	(Pulse)	CAPST. PWM	Capstan motor control signal output.
26	O	(Pulse)	CYL. PWM	Cylinder motor control signal output.
27	O	(Pulse)	V.ADD	Artificial V (vertical) sync pulse output. This pulse is output in the still play mode.
28	O	(Pulse)	SW30/25Hz[Lo]	Inverted head switching pulse output.
29	-----	-----	HEAD AMP SW	Nout used. Open.
30	-----	-----	COMP	Not used. Connected to ground.
31	I/O	(Pulse)	CTL(+)	CTL pulse output/input. Connected to CTL head.
32	I/O	(Pulse)	CTL(-)	
33	-----	-----	GND	Grounded.
34	-----	-----	CTL SW	Not used. Open.
35	I	Lo	CTL AMP(-)	Input terminals of the CTL amplifier in the IC901.
36	I	Hi	CTL AMP(+)	
37	O	(Pulse)	CTL OUT	CTL pulse output. Connected to TP601 (test point) and PG603-4 (test plug)
38	I	(Pulse)	CYL. FG	CYL. FG pulse input.
39	I	(Pulse)	CYL. PG	CYL. PG pulse input.
40	I	(Pulse)	CAPST. FG	CAPST. FG pulse input.
41	-----	-----	Vcc	Connected to 5V.
42	-----	-----	Vcc	
43	-----	-----	-----	Not used. Open.
44	-----	-----	V.REF	
45	-----	-----	-----	
46	-----	-----	-----	
47	-----	-----	-----	

Pin No.	I/O	Active Level	Abbreviation	Function
48	-----	-----	-----	Not used. Open.
49	-----	-----	GND	Grounded.
50	I	(Pulse)	OSC IN	Generates OSD clock pulse by the resisto (R986), coil (L902) and capacitors
51	O	(Pulse)	OSC OUT	(C936, C937).
52	O	(Pulse)	2fsc OUT	2fsc(7.16MHz) pulse input.
53	I	(Pulse)	2fsc IN	
54	I	(Pulse)	H/C SYNC	Horizontal sync pulse input.
55	I	(Pulse)	V SYNC	Vertcal sync pulse input.
56	O	(Pulse)	COUNTER	OSD (counter) signal output.
57	O	Hi	POWER ON	Turns the switching regulator on to activate the camera block and VCR block.
58	O	(Pulse)	DATE/TIME	OSD (date/time) signal output.
59	O	Lo	CAM RESET [Lo]	Output "Lo" when the power is turned of to initialize the digital microprocessor (IC1106) and digital signal processor (IC1102).
60	-----	-----	-----	Not used. Open.
61	O	Lo	CAMERA ON [Lo]	When the camera block is turned on, this pin outputs "Lo" to change over the switch in the video amp (IC203) to "CAMERA".
62	O	Hi	CAPST.BRAKE	Disables the output of the capstan servo in the fast forward and rewind modes and stops the capstan motor in the stop and pause modes.
63	O	Hi	CAPST.REV	Reverses the tape in the rewind and reverse search modes.
64	O	Hi	LIGHT ON	Output "Hi" controlled by the voltage at pin 5, and drives the DC light switch (Q509: DC LIGHT SW) to turn the DC light on.
65	O	Hi	MUTE	Mutes the audio signals.
66	O	(Pulse)	T.FADE	Outputs a signal when the FADE button is pressed. (Open for models without the FADE function.)
67	O	Hi	A/C HEAD SW	Controls the audio/control (A/C) head switches (Q401, Q402: A/C HEAD SW) to supply the signal to the A/C head.
68	-----	-----	-----	Not used. Connected to ground.
69	I	(Pulse)	X'TAL-2	Generates 32kHz clock pulse by the crystal oscillator (CX902: 32kHz) for backup of the 8MHz clock pulse.
70	O	(Pulse)	X'TAL-1	
71	-----	-----	GND	Grounded.
72	-----	(Pulse)	OSC-1	Generates 10MHz clock pulse by the oscillator(CX901 10MHz) in the power on mode.
73	I	(Pulse)	OSC-2	
74	O	Hi	LOAD MOTOR (-)	Control the loading motor.
75	O	Hi	LOAD MOTOR (+)	
76	O	Lo	PB[Lo]	Generates the PB5V in the preamp circuit.
77	O	Lo	REC/INSERT [Lo]	Generates the REC5V (REC/INSERT 5V) in the preamp circuit.
78	-----	-----	-----	Not used. Connected to 5V via resistor.
79	I	Lo	M.STATE-2[Lo]	Detect the mechanism state.
80	I	Lo	M.STATE-1[Lo]	
81	I	Lo	M.STATE-0[Lo]	
82	-----	-----	-----	Not used. Connected to 5V via resistor.
83	I	Lo	CASSETTE SW[Lo]	Detects the position of the cassette holder.
84	I	(Pulse)	T.REEL	Calculates the tape remaining time, counts up the tape counter and detects the reel lock.
85	I	(Pulse)	S.REEL	Calculates the tape remaining time.
86	I	Lo	TAB SW[Lo]	Detects whether the tab is present or not to avoid accidental erasing.
87	I	(Pulse)	CS(D-S)	Communicate with the digital microprocessor (IC1106).
95	I	(Pulse)	CLOCK(S-D)	
96	I	(Pulse)	DATA(D-S)	
97	O	(Pulse)	DATA(S-D)	
88	I	Lo	V.DET[Lo]	Detects disconnection of the battery or the AC adapter and enters the backup mode.

Pin No.	I/O	Active Level	Abbreviation	Function
89	I	Lo	WAKE-UP[Lo]	Changes the clock pulse to 8MHz from 32kHz when the EJECT switchis pressed, when the CAMERA/VCR switch is set to on or when the cassette holder is closed.
90	I	Lo	VCR SW[Lo]	Detects the position of the CAMERA/VCR switch to enter the VCR mode.
91	I	Lo	CAMERA SW [Lo]	Detects the position of the CAMERA/VCR switch to enter the CAMERA mode.
92	I	Lo	EJECT SW[Lo]	Detects the operation of the EJECT switch to eject the cassette.
93	I	Lo	REC START[Lo]	Detects the operation of the REC START/STOP switch.
94	-----	-----	-----	Not used. Open.
99	O	(Pulse)	END LED	Lights the end LED to detect the tape end.

CHAPTER 7 VM-ACV23E (AC ADAPTER/CHARGER)

1. EXPLODED VIEW & REPLACEMENT PARTS LIST



SYMBOL-NO	P-NO	DESCRIPTION
⚠ 751	EV10441	CORD, POWER
⚠ F1	4115881	FUSE 1.6A

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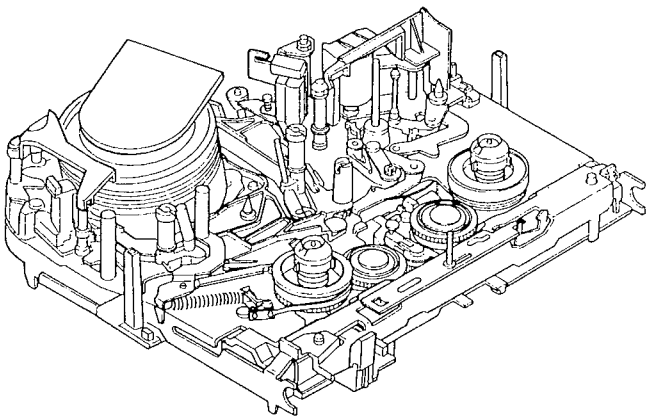
HITACHI

SERVICE MANUAL

TK | No. 6704E

PCF-9 MECHANISM

Disassembly & Adjustment



VHS

This video deck is a VHS type video recorder. For proper operation, only the VHS type cassette must be used.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

VIDEO CAMERA/RECORDER

February 1997 Image & Information Media Systems Division, Tokai

ENGLISH

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CHAPTER 1 DISASSEMBLY

1. REMOVAL PROCEDURE

Before removing specific parts, see the table below to check the removal procedure.
Remove the parts in the left column before removing the part in the right column.
Remove the parts from the the top to the bottom of the left column in order.
The parts not shown in the right column can be removed independently.

Example: Parts to remove in advance before removing the tension arm in item 3-9.

		3-9 Tension Arm
3-1	Cassette Holder	①
3-1	Supply Sensor Circuit Board	②

ITEM No. / REMOVE PARTS		3-8 Pressure Roller Assembly	3-9 Tension Arm	3-9 Tension Band	3-10 Supply Reel Disk	3-11 Take-up Reel Disk	3-12 Take-up Sub Brake	3-15 A/C Head Base
ITEM No	ORDER FOR REMOVING PARTS							
3-1	Cassette Holder	①	①	①	①	①	①	
3-1	Supply Sensor Circuit Board	②	②	②	②	②	②	
3-3	A/C Head							①
3-9	Tension Arm				③			
3-9	Tension Band				④			

ITEM No. / REMOVE PARTS		3-17 Supply Guide Roller Base	3-17 Take-up Guide Roller Base	3-17 Guide Roller Rail	3-17 End LED	3-18 Supply Sub Brake	3-19 Cylinder Base	3-20 Supply Loading Cam Gear	3-20 Take-up Loading Cam gear
ITEM No	ORDER FOR REMOVING PARTS								
3-1	Cassette Holder	①	①	①	①	①	①	①	①
3-1	Supply Sensor Circuit Board	②	②	②	②	②	②	②	②
3-2	Cylinder	③	③	③	③	③	③	③	③
3-3	A/C Head	④	④	④	④	④	④	④	④
3-4	FE Head	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤
3-9	Tension Arm	⑥	⑥	⑥	⑥	⑥	⑥	⑥	⑥
3-9	Tension Band	⑦	⑦	⑦	⑦	⑦	⑦	⑦	⑦
3-13	Supply Guide Roller	⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧
3-14	Take-up Guide Roller	⑨	⑨	⑨	⑨	⑨	⑨	⑨	⑨
3-15	A/C Head Base	⑩	⑩	⑩	⑩	⑩	⑩	⑩	⑩
3-17	Supply Guide Roller Base					⑪	⑪	⑪	⑪
3-17	Take-up Guide Roller Base					⑫	⑫	⑫	⑫
3-17	Guide Roller Rail					⑬	⑬	⑬	⑬
3-17	End LED					⑭	⑭	⑭	⑭
3-19	Cylinder Base							⑮	⑮

ITEM No. / REMOVE PARTS / ITEM No / ORDER FOR REMOVING PARTS	3-21 Take-up Guide Arm	3-22 Pressure Roller Control Arm	3-23 Cassette Holder Lock Slider	3-24 Reel Gear Block	3-24 Mechanism State Switch	3-24 Relay Gear	3-25 Loading Gear	3-26 Tension Pole Drive Arm
3-1 Cassette Holder	①	①	①					
3-1 Supply Sensor Circuit Board	②	②	②					
3-6 Take-up Sensor Circuit Board				①	①	①	①	①
3-8 Pressure Roller Assembly	③	③						
3-24 Reel Gear Block							②	②

ITEM No. / REMOVE PARTS / ITEM No / ORDER FOR REMOVING PARTS	3-27 Driving Gear	3-28 Cassette Holder Lock	3-29 Cam Gear Arm	3-30 Cassette Holder Lock Drive Arm				
3-6 Take-up Sensor Circuit Board	①	①	①	①				
3-7 Capstan Motor			②	②				
3-24 Reel Gear Block	②	②	③	③				
3-25 Loading Gear	③		④	④				
3-26 Tension Pole Drive Arm	④		⑤	⑤				
3-27 Driving Gear			⑥	⑥				
3-29 Cam Gear Arm				⑦				

2. MAIN MECHANICAL COMPONENTS IDENTIFICATION

2-1. Top View

1. Cylinder (Video Head)
2. Guide Roller Rail
3. X-Value Adjust Nut
4. Take-up Guide Roller
5. Audio/Control (A/C) Head
6. Take-up Guide Pole
7. Pressure Roller Assembly
8. Take-up Guide Arm
9. EST (Take-up End Sensor) Circuit Board
10. EL (End LED) Circuit Board
11. Take-up Reel Disk
12. Cassette holder Lock Slider
13. Reel Gear Block
14. Supply Reel Disk
15. Tension Band
16. Tension Arm
17. Supply Guide Roller
18. ESS (Supply End Sensor) Circuit Board
19. Supply Guide Post
20. Supply Guide Pole
21. Full Erase (FE) Head
22. Cylinder Cover

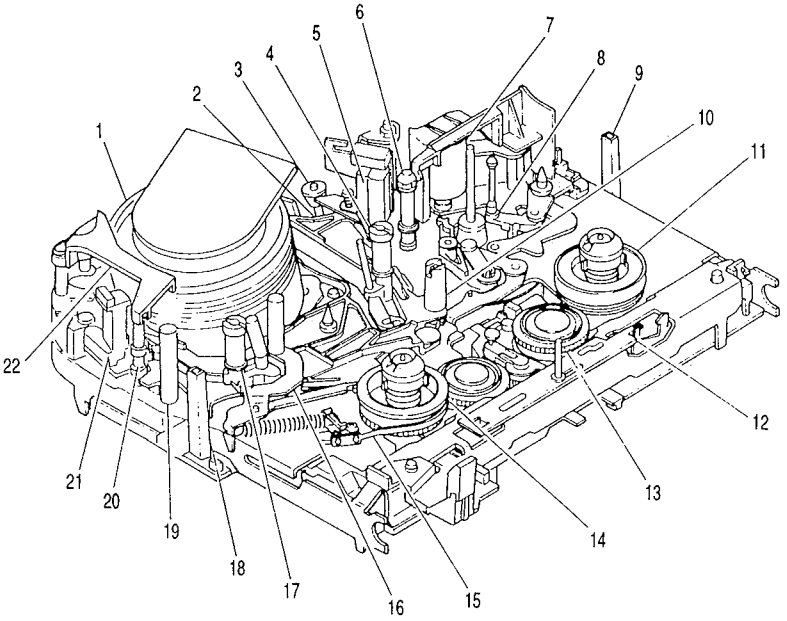


Fig. 2-1

2-2. Bottom View

1. Cylinder (Video Head)
2. Supply Loading Cam Gear
3. Loading Motor
4. Tension Pole Drive Arm
5. Mechanism State Switch
6. TSS (Supply Sensor) Circuit Board
7. Loading Gear
8. Driving Gear
9. ERS (Take-up Sensor) Circuit Board
10. Capstan Motor
11. Take-up Loading Cam Gear

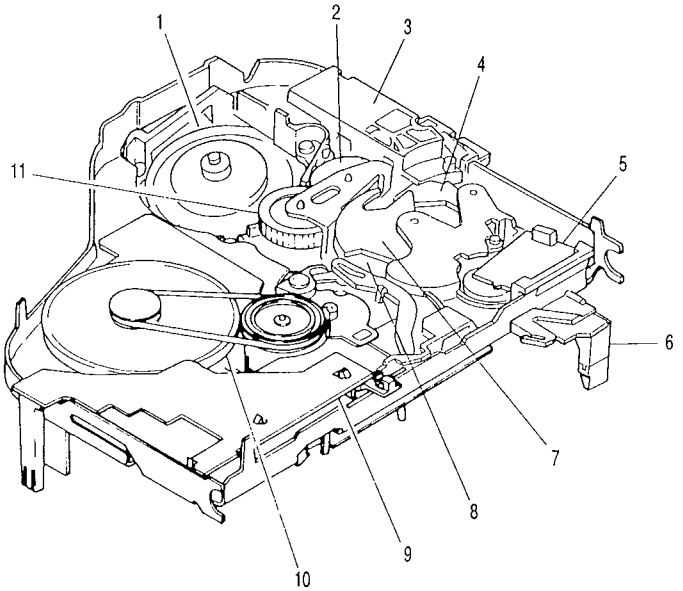


Fig. 2-2

3. MAIN MECHANICAL COMPONENTS REMOVAL

Note: For the item marked *, refer to the Removal Procedure in item 1.

3-1. Cassette Holder and TSS (Supply Sensor) Circuit Board

1) Remove 1 screw (1) holding the TSS circuit board. (See Fig. 3-1)
2) Release 1 tab (2) and lift up the cassette holder. (See Fig. 3-2)
3) Remove the TSS circuit board in the direction of the arrow. (See Fig. 3-1)
4) Remove 2 screws (3) holding the cassette holder and cassette holder spring. (See Fig. 3-3)
5) Remove 1 screw (4) holding the cassette holder and chassis holder. (See Fig. 3-4)
6) Move the front arm of the cassette holder in the direction of arrow (A). (See Figs. 3-3, 3-4)
7) Move the rear arm of the cassette holder in the direction of arrow (B). (See Figs. 3-3, 3-4)

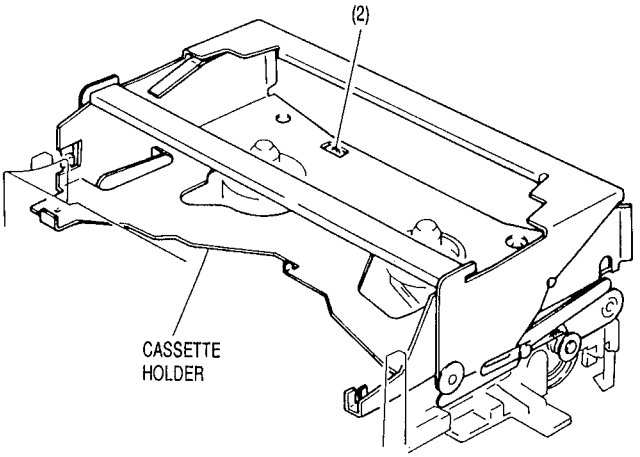


Fig. 3-2

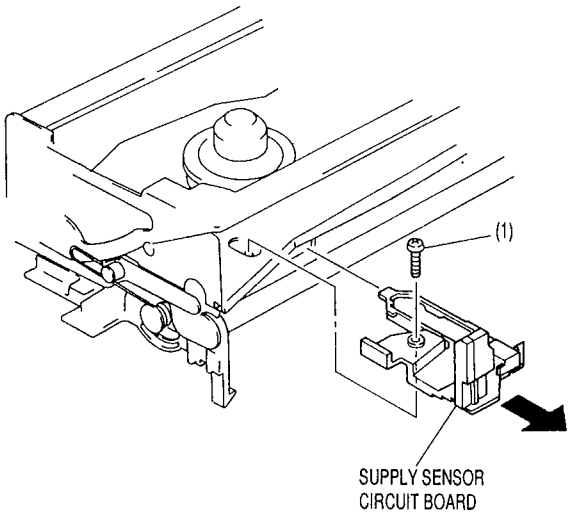


Fig. 3-1

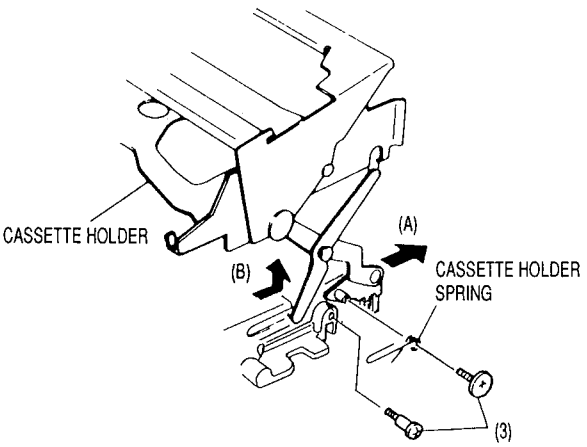


Fig. 3-3

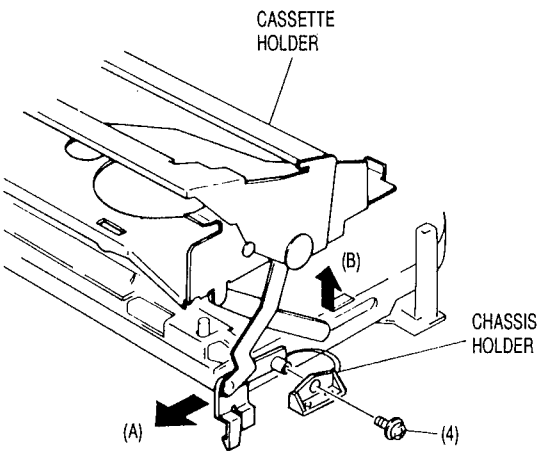


Fig. 3-4

3-2. Cylinder (Video Heads)

1) Remove 1 screw (1) holding the cylinder cover. (See Fig. 3-5)
2) Remove 3 screws (2) holding the cylinder and pull out the cylinder from the chassis. (See Fig. 3-6)

Cautions :

1. Do not touch the video head tips with your fingers or tools.
2. After reinstalling the cylinder, be sure to perform adjustment after replacing the cylinder.

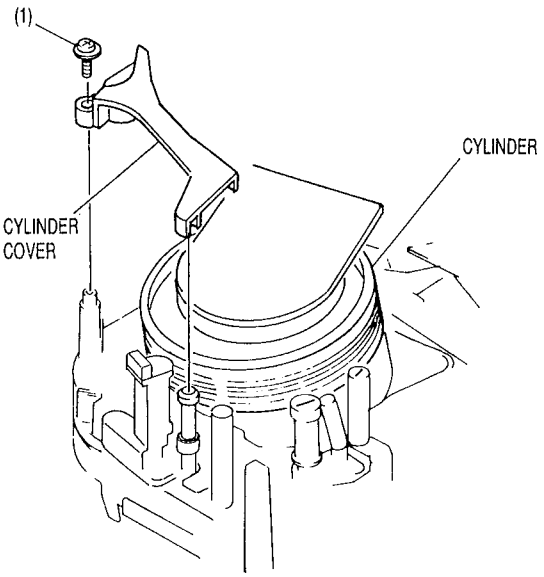


Fig. 3-5

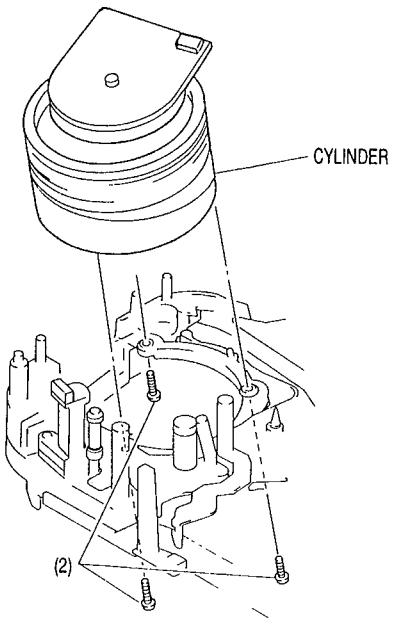


Fig. 3-6

3-3. Audio/Control (A/C) Head

1) Disconnect the connector (1). (See Fig. 3-7)
2) Remove 2 screws (2).

Caution :

1. Adjust as follows after installing the Audio/ Control Head.
   - A/C HEAD ADJUSTMENT

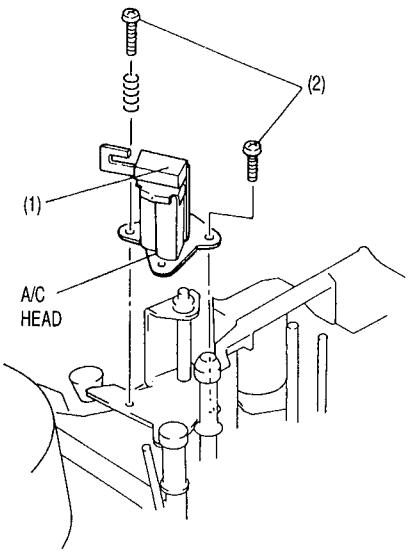


Fig. 3-7

3-4. Full Erase (FE) Head

1) Disconnect the connector (1). (See Fig. 3-8)
2) Remove 1 screws (2).

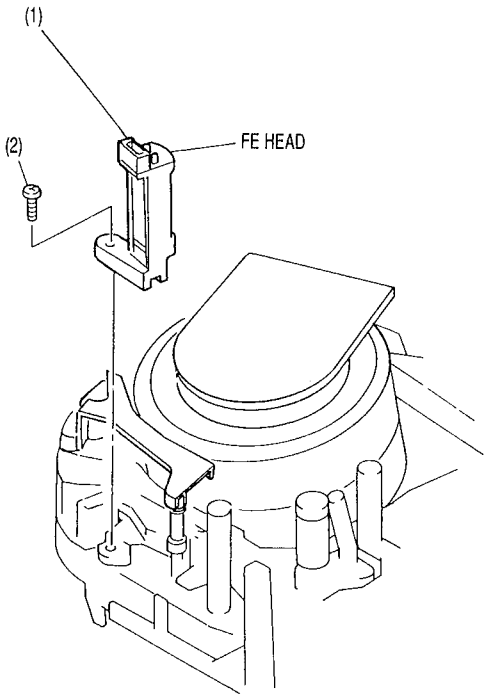


Fig. 3-8

3-5. ESS (Supply End Sensor) Circuit Board and Loading Motor

1) Remove 1 screw (1) holding the ESS circuit board.
2) Release 1 tab (2) of the ESS circuit board.
3) Remove the ESS circuit board.
4) Remove 1 screw (3) holding the motor holder.
5) Release 1 tab (4) of the motor holder.
6) Remove the motor holder.
7) Release 3 tabs (5) holding the loding motor.

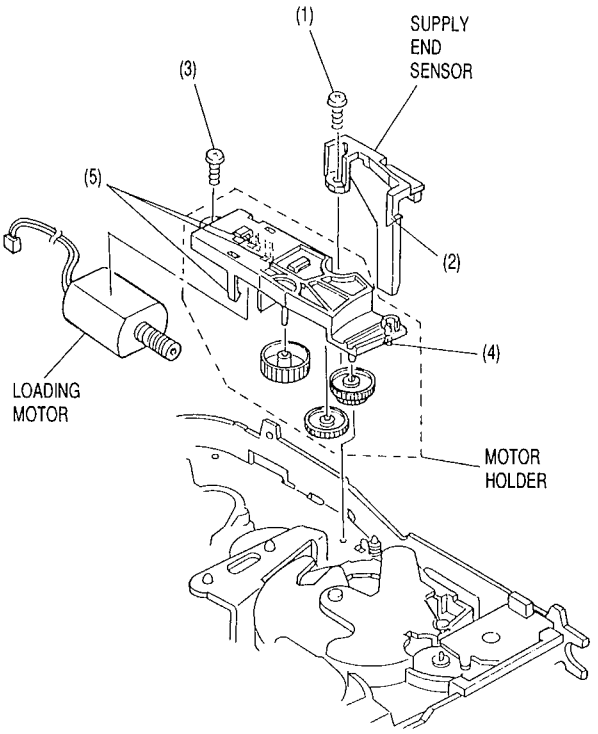


Fig. 3-9

3-6. ERS (Take-up Sensor) Circuit Board (Take-up Reel Sensor/Take-up End Sensor/Cassette Holder Switch)

1) Remove 2 screw (1). (See Fig. 3-10)
2) Release 3 tabs (2) and open the ERS circuit board.

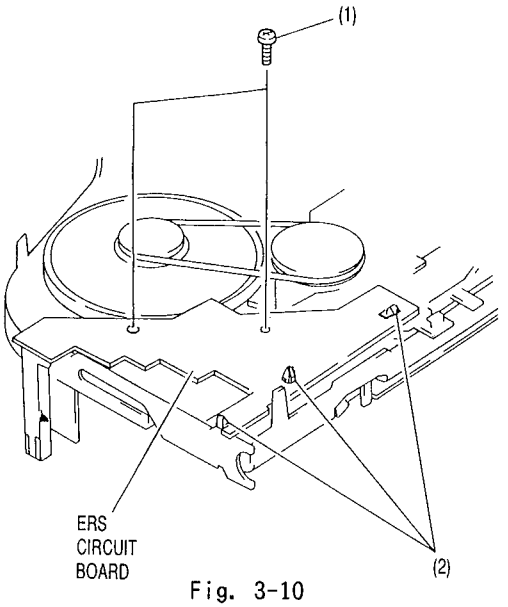


Fig. 3-10

3-7. Capstan Motor

1) Move the take-up guide arm in the direction of the arrow (pressure roller side). (See Fig. 3-11)
2) Remove 3 screws (1).
3) Disconnect the connector (2). (See Fig. 3-12)
4) Remove the capstan belt from the capstan motor.
6) Remove the capstan motor.

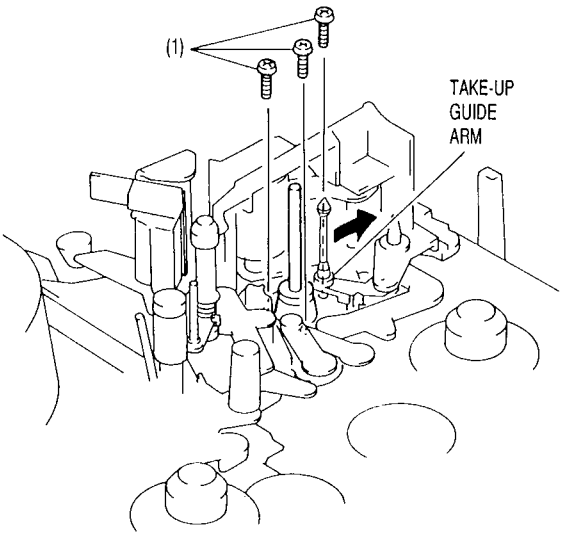


Fig. 3-11

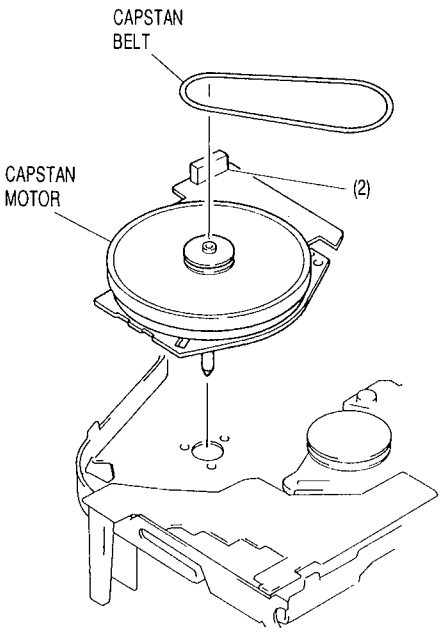


Fig. 3-12

*3-8. Pressure Roller Assembly

1) Remove 2 screws (1). (See Fig. 3-13)
2) Pull out the pressure roller assembly.

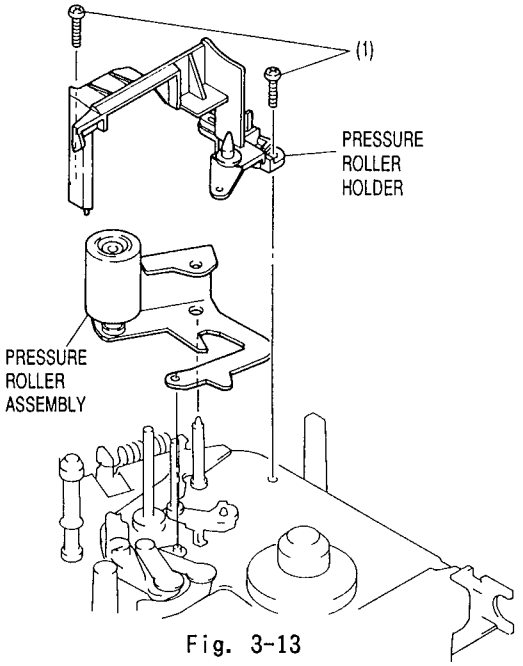


Fig. 3-13

*3-9. Tension Arm and Tension Band

1) Remove 1 tab (1) holding the tension arm (See Fig. 3-14)
2) Release the tension spring.
3) Remove 1 screw (2) holding the tension band.
4) Move the supply sub brake in the direction of the arrow.
5) Remove the tension arm and tension band.
6) Release 1 tab (3) and remove the tension band from the tension arm.

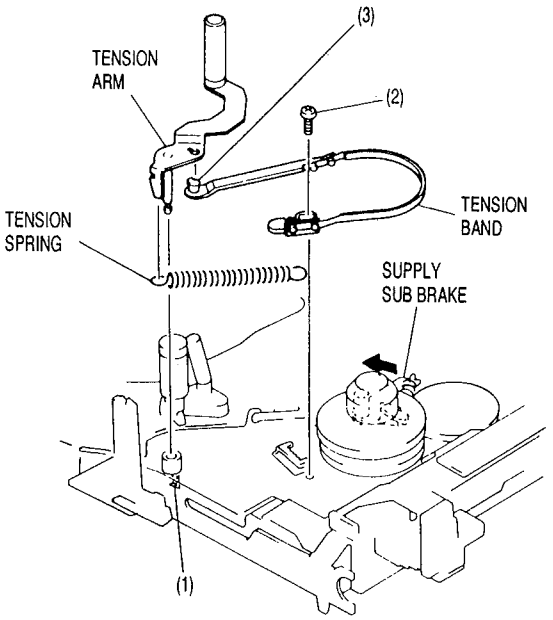


Fig. 3-14

*3-10. Supply Reel Disk

1) Remove 1 washer (1). (See Fig. 3-15)
2) Move the supply sub brake in the direction of the arrow.
3) Pull out the supply reel disk.

Cautions :

1. Take care not to lose the washer at the bottom of the reel disk.
2. Adjust as follows after installing the supply reel disk.
   · REEL DISK HEIGHT ADJUSTMENT

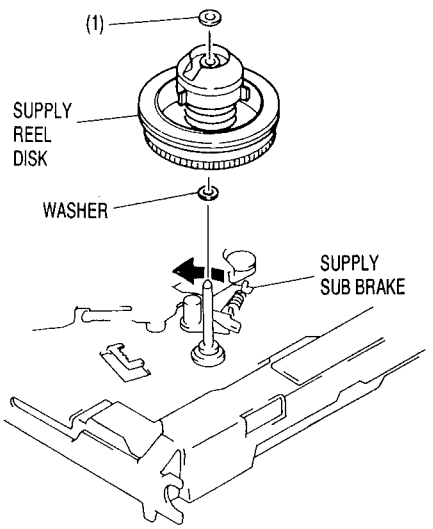


Fig. 3-15

*3-11. Take-up Reel Disk

1) Remove 1 washer (1). (See Fig. 3-16)
2) Pull out the take-up reel disk.

Cautions :
1. Take case not to lose the washer at the bottom of the reel disk.
2. Adjust as follows after installing the take-up reel disk.
   · REEL DISK HEIGHT ADJUSTMENT

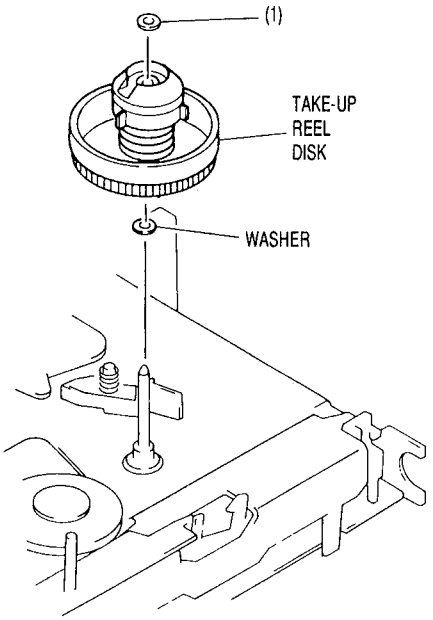


Fig. 3-16

*3-12. Take-up Sub Brake

1) Remove the spring between the chassis and take-up sub brake. (See Fig. 3-17)
2) Release 1 tab (1) and pull out the take-up sub brake.

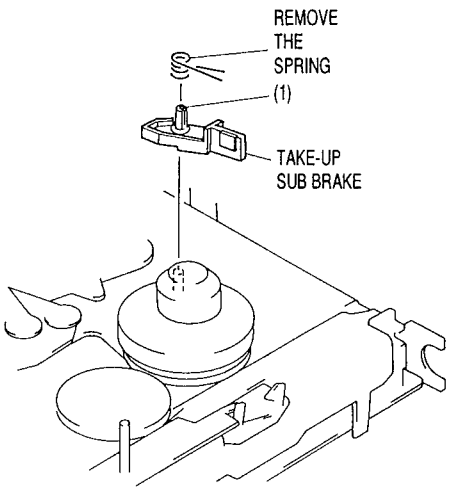


Fig. 3-17

3-13. Supply Guide Roller

1) Loosen 1 hexagonal screw (1) holding the supply guide roller. (See Fig. 3-18)
2) Turn the upper section of the supply guide roller using a flat-head driver to remove the supply guide roller from the supply guide roller base.

Caution :
1. Adjust as follows after installing the supply guide roller.
   · SUPPLY/TAKE-UP GUIDE ROLLER HEIGHT ADJUSTMENT

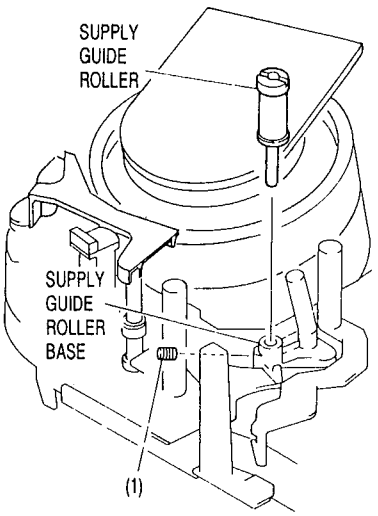


Fig. 3-18

3-14. Take-up Guide Roller

1) Loosen 1 hexagonal screw (1) holding the take-up guide roller. (See Fig. 3-19)
2) Turn the upper section of the take-up guide roller using a flat-head driver to remove the take-up guide roller from the take-up guide roller base.

Caution :
1. Adjust as follows after installing the take-up guide roller.
   - SUPPLY/TAKE-UP GUIDE ROLLER HEIGHT ADJUSTMENT

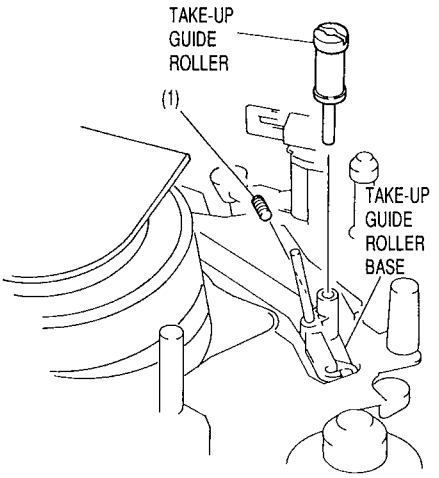


Fig. 3-19

*3-15. A/C Head Base

1) Remove 1 nut (1). (See Fig. 3-20)
2) Pull out the A/C head base together with the spring.

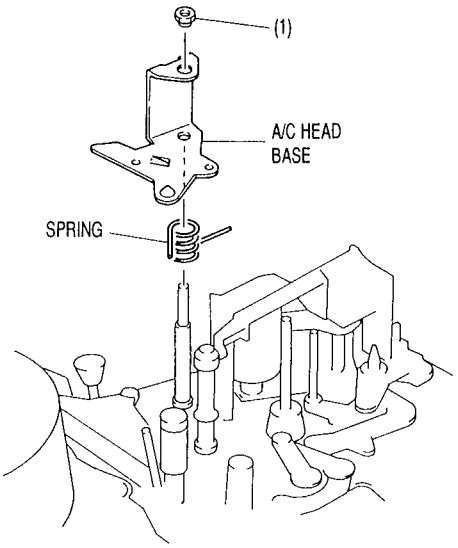


Fig. 3-20

3-16. Take-up Guide Pole

1) Turn the nut (5.0mm) at the top of the take-up guide pole and remove the take-up guide pole. (See Fig. 3-21)

Caution :
1. Adjust as follows after installing the take-up guide pole.
   - TAKE-UP GUIDE POLE HEIGHT ADJUSTMENT

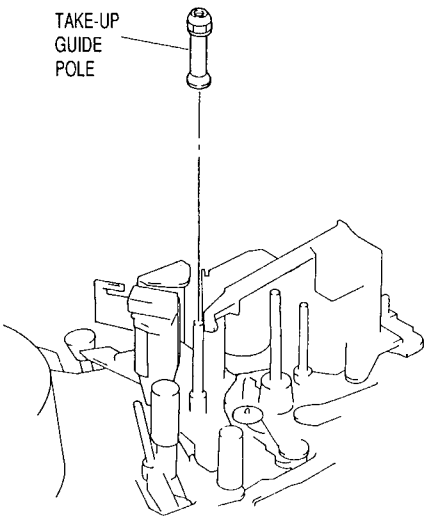


Fig. 3-21

*3-17. Supply Guide Roller Base, Take-up Guide Roller Base, Guide Roller Rail and End LED

1) Remove 3 screws (1) holding the guide roller rail. (See Fig. 3-22)
2) Release 7 tabs (2) and remove the guide roller rail together with the supply guide roller base, take-up guide roller base and end LED.
3) Remove the end LED in the direction of the arrow from the guide roller rail.

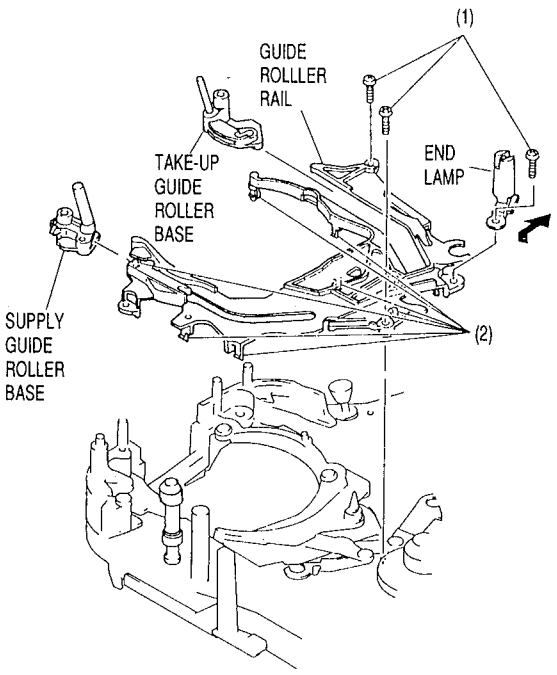


Fig. 3-22

*3-18. Supply Sub Brake

1) Release the spring between the supply sub brake and chassis. (See Fig. 3-23)
2) Pull out the supply sub brake.

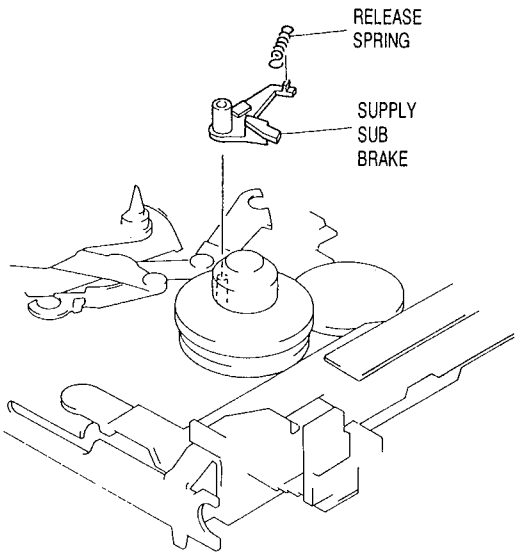


Fig. 3-23

*3-19. Cylinder Base

1) Remove 3 screws (1). (See Fig. 3-24)

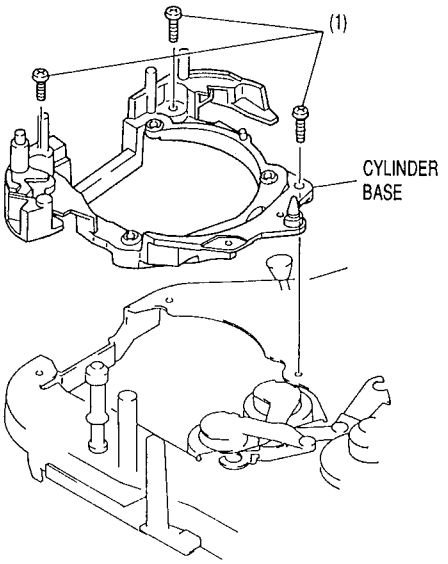


Fig. 3-24

*3-20. Supply Loading Cam Gear and Take-up Loading Cam Gear

1) Remove the supply loading cam gear and take-up loading cam gear. (See Fig. 3-25)

Caution when reinstalling

1) Align mark (A) on the supply loading cam gear and mark (B) on the take-up loading cam gear when reinstalling them. Check that the supply and take-up guide roller bases are in the unloading (stop) state (as shown in Fig. 3-26).

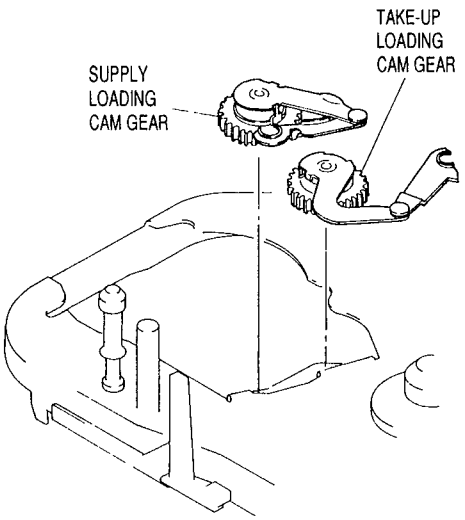


Fig. 3-25

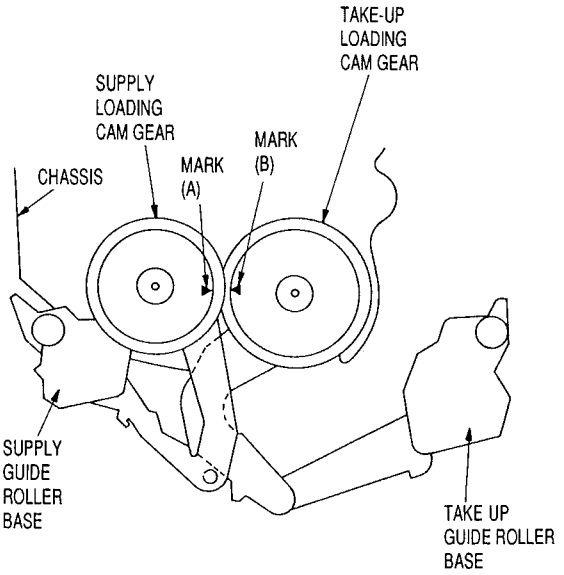


Fig. 3-26

*3-21. Take-up Guide Arm

1) Release the spring between the take-up guide arm and chassis. (See Fig. 3-27)
2) Pull out the take-up guide arm.

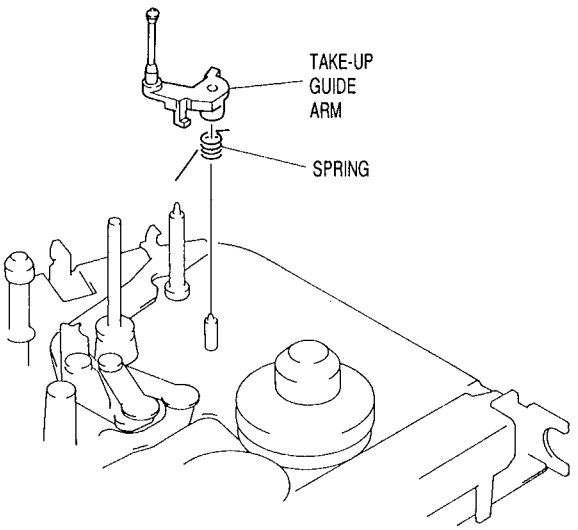


Fig. 3-27

*3-22. Pressure Roller Control Arm

1) Release the spring betweeen the pressure roller control arm and chassis. (See Fig. 3-28)
2) Remove 1 washer (1) holding the pressure roller control arm.
3) Pull out the pressure roller control arm from the chassis.

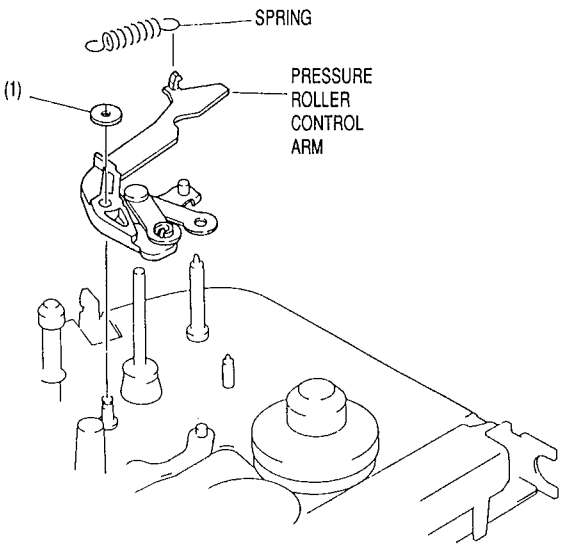


Fig. 3-28

*3-23. Cassette Holder Lock Slider

1) Remove 1 washer (1) and release 1 tab (2). (See Fig. 3-29)

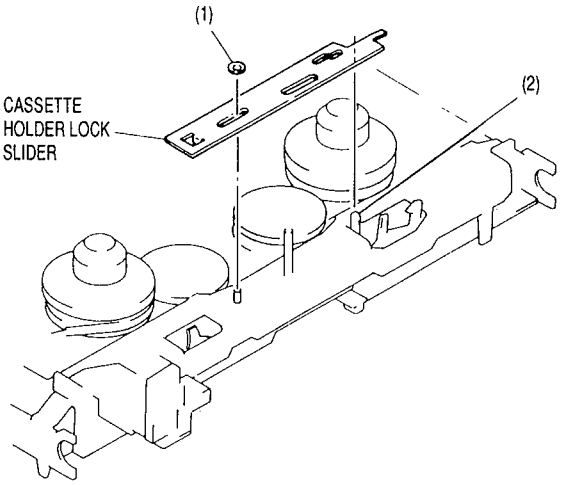


Fig. 3-29

*3-24. Reel Gear Block, Mechanism State Switch and Relay Gear

1) Remove the capstan belt from the reel gear block. (See Fig. 3-30)
2) Disconnct 1 connector (1) on the mechanism state switch
3) Remove 1 screw (2) holding the mechanism state switch.
4) Remove the mechanism state switch.
5) Remove the relay gear.
6) Remove 4 screws (3) holding the reel gear block.
7) Remove the reel gear block.

Caution when reinstalling

1) Reinstall the loading gear so its mark (c) and mark (D) on the supply loading cam gear are aligned. (See Fig. 3-32)
2) Reinstall the tension pole drive arm so that hole (E) in this arm is aligned with hole (F) in the driving gear.
3) Align section (A) of the mechanism state switch and mark (B) of the rotor. (See Fig. 3-31)
4) Align hole (G) in the driving gear and mark (H) on the relay gear. Check that hole (I) in the relay gear in aligned with the hole in reel gear block. (See Fig. 3-32)
5) Install the mechanism state switch in condition set in step 3) in to the chassis.

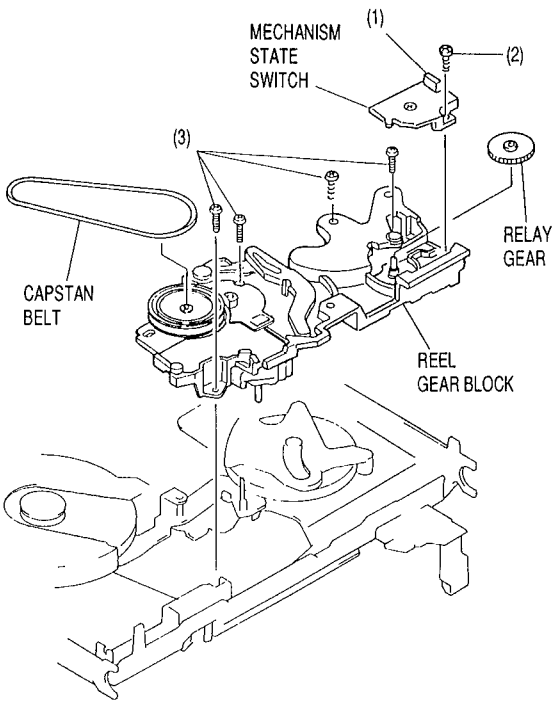
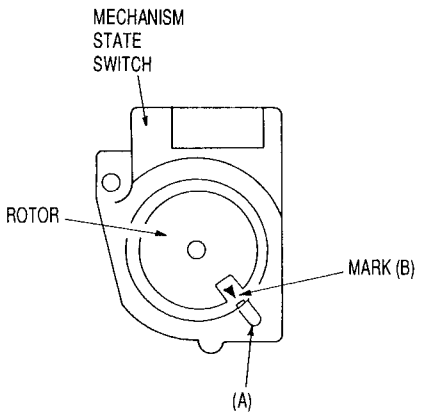
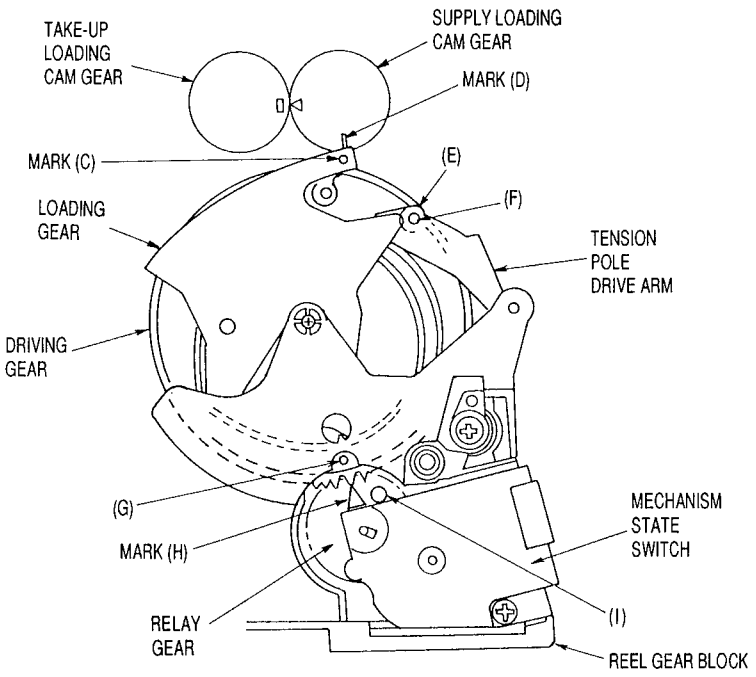


Fig. 3-30



(BOTTOM VIEW)

Fig. 3-31



(TOP VIEW)

Fig. 3-32

*3-25. Loading Gear

1) Pull out the loading gear. (See Fig. 3-33)

Caution when reinstalling

1) Refer to the Fig. 3-32

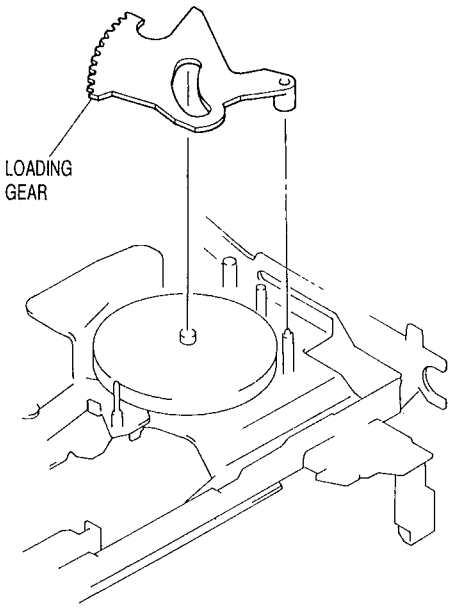


Fig. 3-33

*3-26. Tension Pole Drive Arm

1) Pull out the tension pole drive arm.
(See Fig. 3-34)

Caution when reinstalling

1) Refer to the Fig. 3-32

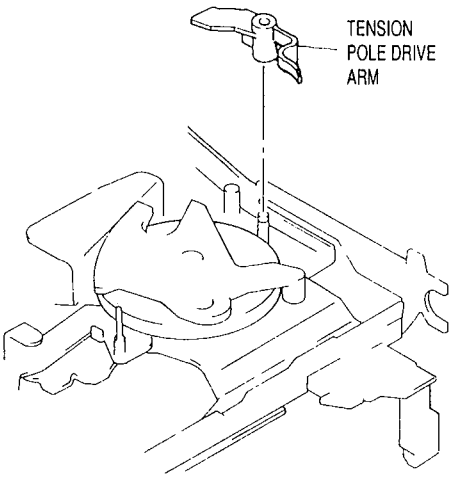


Fig. 3-34

*3-27. Driving Gear

1) Pull out the driving gear. (See Fig. 3-35)

Caution when reinstalling

1) Move the cassette holder lock drive arm so that the pin comes into contact with section (A) of the cam gear arm. (See Fig. 3-36)
2) Reinstall the driving gear so that hole (B) in the driving gear is aligned with the through-hole in the chassis. (See Fig. 3-37)

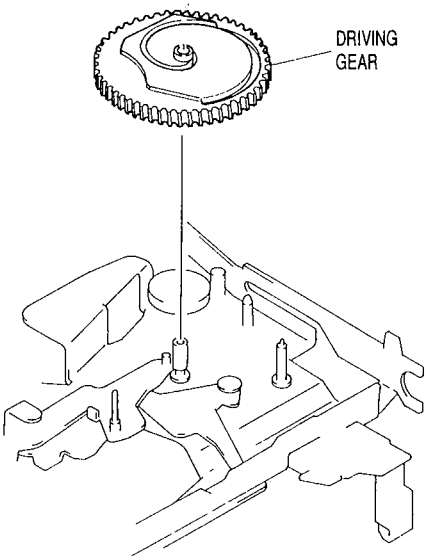


Fig. 3-35

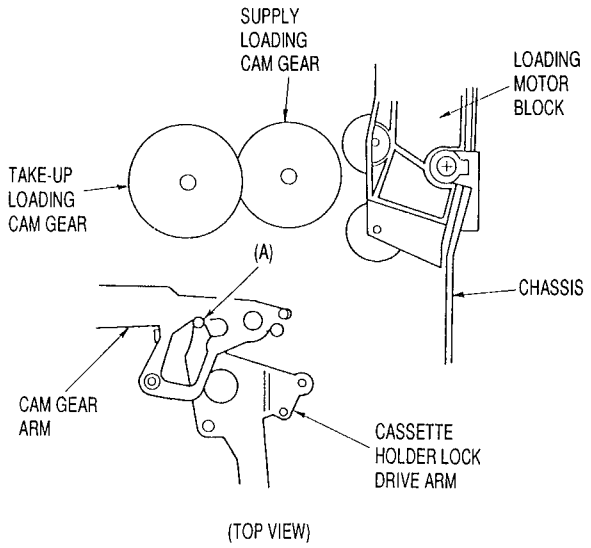


Fig. 3-36

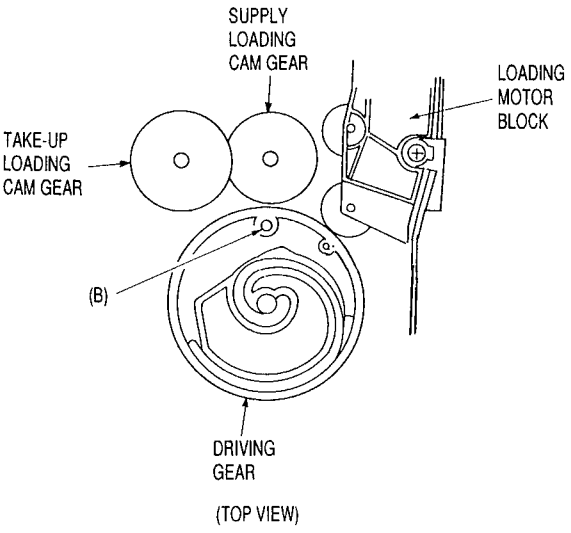


Fig. 3-37

*3-28. Cassette Holder Lock

1) Remove 1 screw (1). (See Fig. 3-38)
2) Release 1 tab (2) and remove the cassette holder lock.

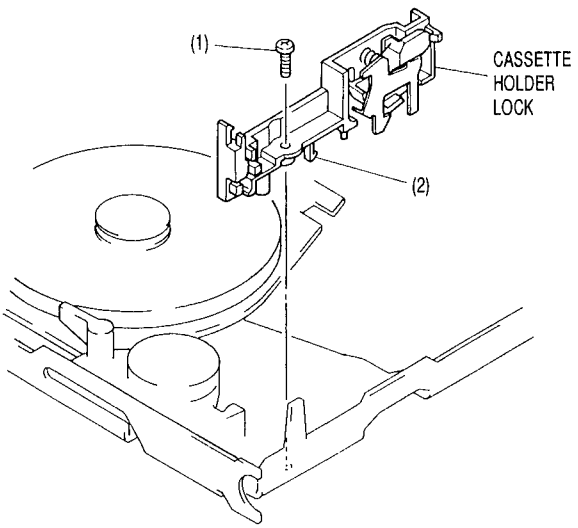


Fig. 3-38

*3-29. Cam Gear Arm

1) Move the cam gear arm in the direction of the arrow. (See Fig. 3-39)
2) Pull out the cam gear arm from the chassis.

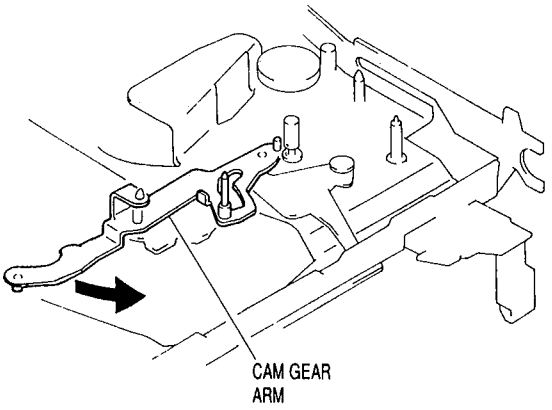


Fig. 3-39

*3-30. Cassette Holder Lock Drive Arm

1) Release the spring between the cassette holder lock drive arm and chassis. (See Fig. 3-40)
2) Pull out the cassette holder lock drive arm.

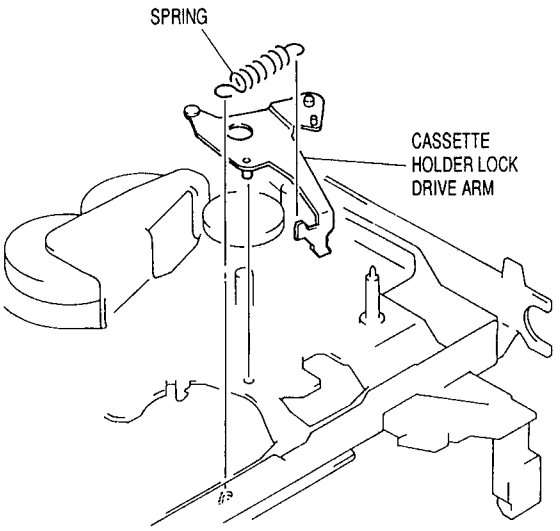
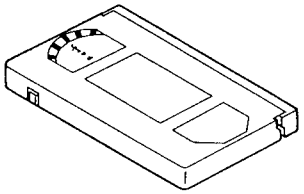
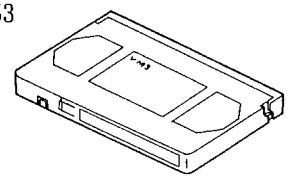
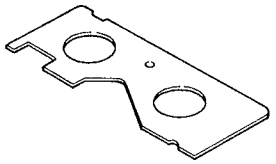
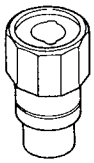
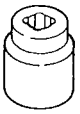
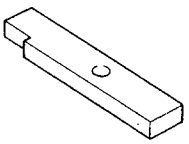
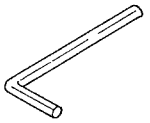


Fig. 3-40

CHAPTER 2 MECHANICAL ADJUSTMENT

JIGS AND TAPES FOR ADJUSTMENT

1. BACK TENSION METER No.7099004 	2. ALIGNMENT TAPE NTSC(MH-1) : No.7099046 PAL(MH-2) : No.7099052 SECAM(MH-4): No.7099053 		3. MASTER PLANE No.7099279 
4. TORQUE GAUGE No.7099039 	5. TORQUE GAUGE ADAPTER No.7099204 	6. REEL DISK HEIGHT JIG No.7099038 	7. HEXAGONAL WRENCH 0.9mm : No.7099202 

1. TAPE TRANSPORT SYSTEM COMPONENTS CHECK/ ADJUSTMENT

The tape transport system is the path from the supply reel disk to the take-up reel disk via the video heads. The tape treansport components, especially the components which come into direct contact with the tape, should be kept clean without damage, dust and oil, etc. adhering to the contact surfaces. The tape transport system is adjusted before shipment from the factory, so when any transport compoents are replaced, the transport system is stabilized by correctly adjusting the new components.

1-1. Reel Disk Height Adjustment (Fig. 1-1)

1) Place the master plane on the cassette holder and lower the holder.
2) Place a reel disk height jig on the master plane and fit it to the reel disk.
3) Check that the top of the reel disk is positioned between sections A and B of the reel disk height jig.
4) When the top of the reel disk is not positioned between section A and B, adjust the number of the spacers (2 types: 0.25mm and 0.5mm thick) at the bottom of the reel disk.

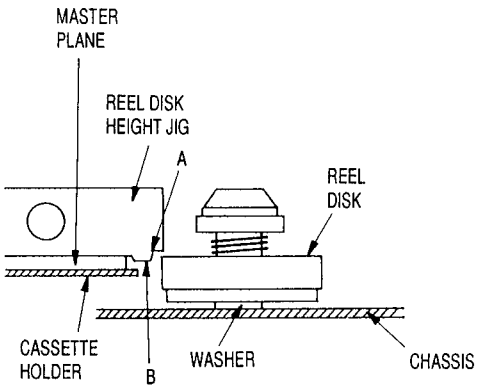


Fig. 1-1

1-2. Tension Pole Position/Tension Adjustment (Fig. 1-2)

Tension Pole Position Adjustment

1) Hook the tension spring to notch (C) of the spring holder.
2) Block the supply end sensor with something which does not transmit light (thick paper, etc.)
3) Press the playback button without loading a cassette to set the unit to the loading state.
4) After loading is completed, loosen screw (B) holding the tension band holder and adjust the position of the tension band holder so the tension pole is above section (A) (concave) of the guide roller rail.
5) After adjustment is completed, tighten screw (B).

Tension Adjustment

1) Load the back tension meter and set to the playback mode.
2) Read the scale on the supply.
3) This reading should be between 19 and 26.
4) Move the tension arm spring to the position "A" or "B" on the spring holder when the tension adjustment tape reads 27 or higher, and to the position "D" or "E" on the spring holder when it is 18 or lower, and adjust the back tension for a nominal reading of 19-26 on the scale.
5) Recheck the tension arm position when the back tension is changed greatly (5 or more).

Note: The instrument must be in a horizontal position for this adjustment.

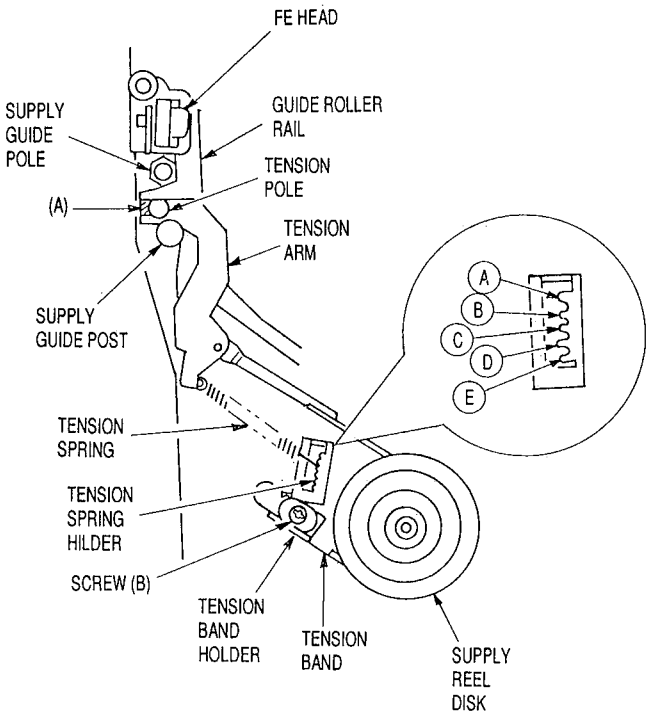


Fig. 1-2

1-3. Take-up Guide Poles Height Adjustment (Fig. 1-3)

1) Place the master plane on the cassette holder and lower the holder.
2) Place a reel disk height jig on the master plane and fit it to the guide pole.
3) Adjust the nut on the top of the guide pole so that the upper flange is aligned with the top edge of the height jig.

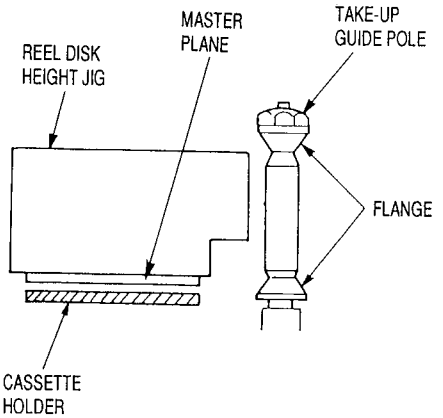


Fig. 1-3

1-4. Supply/Take-up Guide Rollers Height Adjustments (Figs. 1-4, 1-5)

1) Place the master plane on the cassette holder and lower the holder.
2) Place the reel disk height jig on the master plane and fit it to the guide roller.
3) Loosen the guide roller fixing hexagonal screw and use a flat-bladed screwdriver, etc. to turn the top of the guide roller to adjust so the upper flange of the guide roller is aligned with the top surface of the reel disk height jig.
4) After adjustment is completed, tighten the guide roller fixing hexagonal screw.
5) Run a blank tape and check that the tape does not curl or ride over the guide roller. If it curls or rides over the guide roller, fine adjust the height of the guide rollers.
6) Connect an oscilloscope to test point of the FM envelope.
7) Trigger the oscilloscope at SW30Hz.
8) Playback the color bar signal on alignment tape and set the TRACKING control to the center position.
9) Check that the FM waveform is flat.
10) If the FM envelope is not flat, fine adjust the height of the supply and take-up guide rollers to flatten the FM envelope.
11) After adjustment is completed, tighten the guide roller fixing hexagonal screw.

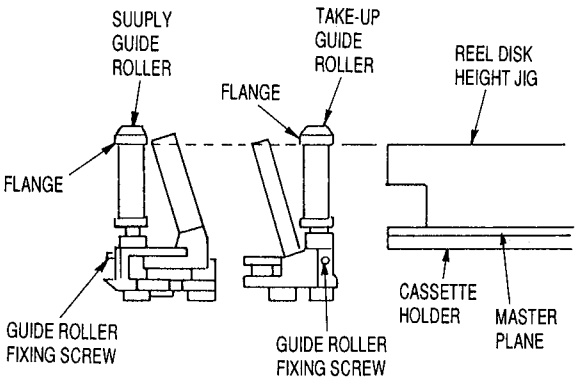
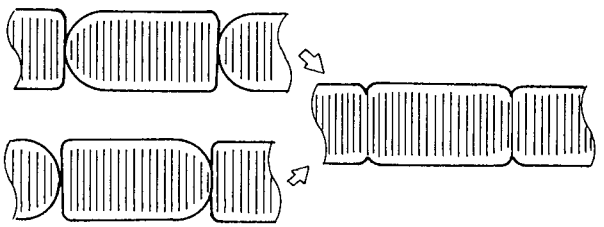


Fig. 1-4



Turn guide roller height adjustment screw a little at a time to flatten waveform.

Fig. 1-5

1-5. A/C Head Adjustment (Figs. 1-6, 1-7)

Perform the height, tilt and azimuth adjustments repeatedly to determine the A/C head installation position, then adjust the X-value.
Detailed adjustment below is the procedure when the A/C head is replaced; be sure to do precise adjustment after rough adjustment.

Note: For the X-value adjustment, refer to the service manual (electrical adjustment) issued for each model.

<u>Rough Adjustment</u> (Fig. 1-6)

1) Place the master plane on the cassette holder and lower the holder.
2) Adjust NUT (A), AZIMUTH SCREW (B), TILT SCREW (C) and SCREW (D) so the height difference between the master plane and A/C head plate is approx. 1.78mm and A/C head base and A/C head plate are parallel.

<u>Precise Adjustment</u> (Figs. 1-6, 1-7)

3) Connect the oscilloscope to audio output (AV OUT).
4) Playback a 1kHz audio signal on the alignment tape.
5) Adjust the AZIMUTH SCREW (B) and TILT SCREW (C) so the audio output is maximum and flat (without any fluctuations). (See Fig. 1-7)

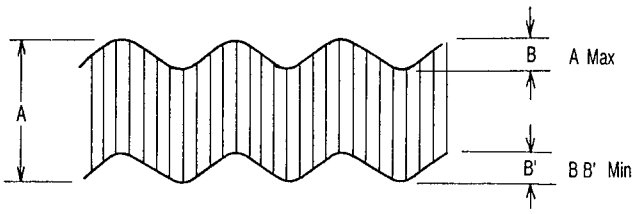


Fig. 1-7

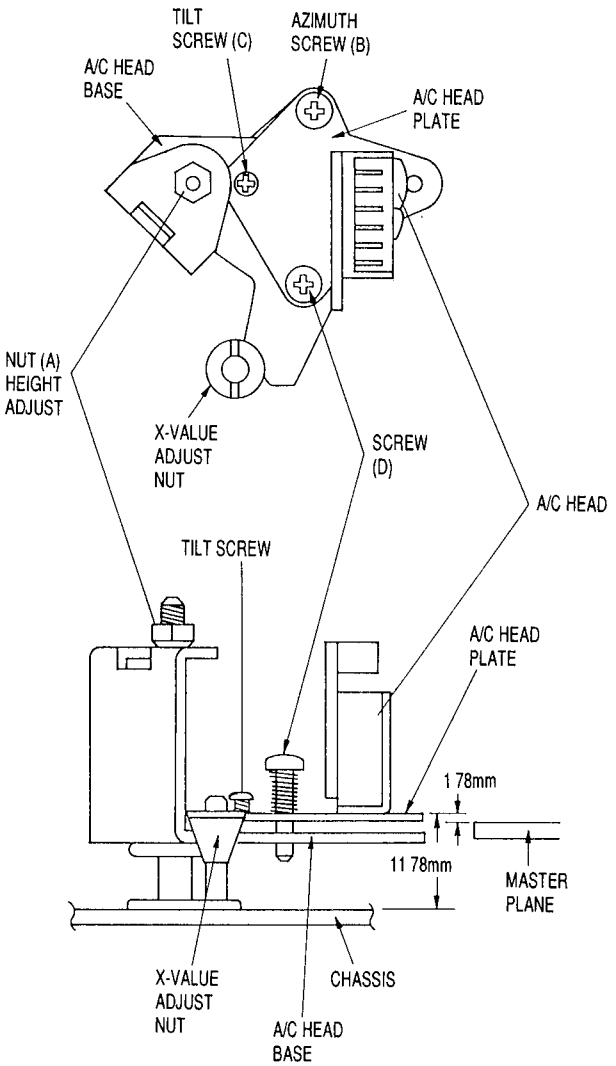


Fig. 1-6

2. ADJUSTMENT AFTER REPLACING THE CYLINDER (VIDEO HEADS)

When the cylinder is replaced, the relative height with respect to the guide rollers or the X-value, etc. drifts (this drift is smallwhen the cylinder is replaced correctly).
Therefore, it is necessary to readjust the tape transport system and servo system. Perform checks and adjustments by the following steps.

Note: For the X-value adjustment, refer to the service manual (electrical adjustment) issued for each model.

1) Load a blank tape and play it. Check that no curling or creasing occurs around the guide rollers. If curling or creasing occurs, fine adjust the height of the guide rollers.
2) Confirm that the FM envelope is flat and level fluctuations are minimum.
   If it cannot be confirmed, adjust the height of the guide rollers. See the next item for these checks.
3) Check or/and adjust the head switching point. (Refer to the service manual (electrical adjustment) issued for each model.)
4) Confirm that the X-value adjustment is correct. If it cannot be confirmed, adjust the X- value.

Check Flatness and Level Fluctuations of the FM Output

1) Connect an oscilloscope to test point of FM envelope.
2) Trigger the oscilloscope at SW30Hz.
3) Set the TRACKING control to center position.
4) Playback the alignment tape.
5) Adjust the voltage level control on the oscilloscope so the maximum amplitude of the FM output is 4 graduations on the oscilloscope.
6) Adjust the tracking control buttons so the maximum amplitude of the FM output is 3 graduations on the oscilloscope.
7) Check that the minimum amplitude is more than 2 graduations. If this cannot be confirmed, fine adjust the height of the guide rollers.

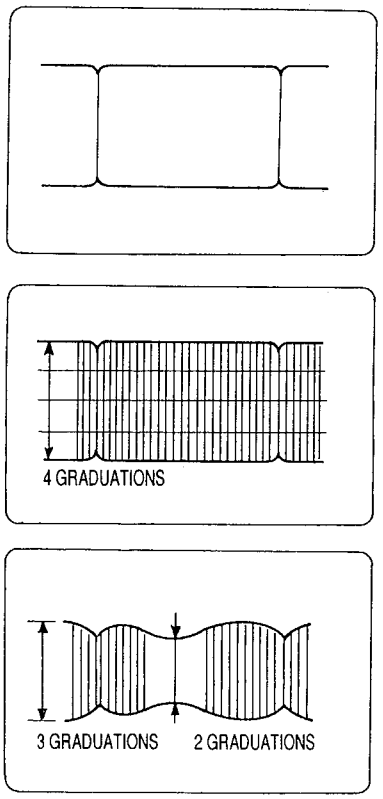


Fig. 2-1

3. TENSION AND TORQUE CHECKS

It is necessary to check the tension, torque and compression strength in the tape take-up section and moving section to smoothen the tape transport and to satisfy the basic performance of the VCR. When the tape transport is not smooth or the tape speed is abnormal, detect the faulty section by this checking, and then check again after replacing the faulty parts with normal ones to complete the work.

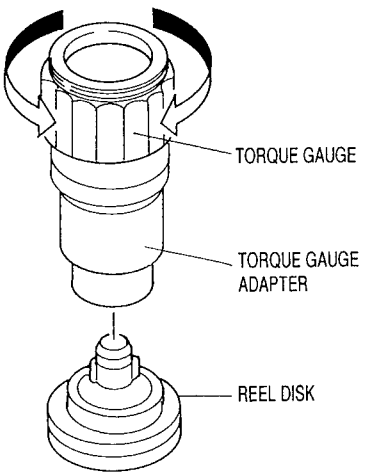


Fig. 3-1

Item	VCR Operation	Measured Reel	Measurement Value	Remarks
Main brake torque	STOP	Supply	140 g·cm or more	Fig. 3-1
		Take-up	100 g·cm or more	Fig. 3-1
Slack removal torque	UNLOADING	Supply	90～200 g·cm	Fig. 3-1
Fast forward torque	F.FWD	Take-up	400 g·cm or more	Fig. 3-1
Rewind torque	REW	Supply	400 g·cm or more	Fig. 3-1
Take-up torque	PLAY	Take-up	80～110 g·cm	Fig. 3-1
Back-tension torque	F.FWD REW	Supply Take-up	4～10 g·cm	Fig. 3-1

CHAPTER 3 MAINTENANCE/INSPECTION PROCEDURE

1. Required Maintenance

The recording density of a VCR is much higher than that of an audio tape recorder. VCR components must be very precise to ensure compatible with other VCRs. If any of these components are worn or dirty, the symptoms will be the same as if the part is defective.
To ensure a good picture, periodic inspection and maintenance, including replacement of worn-out parts and lubrications, is necessary.

2. Scheduled Maintenance

Schedules for maintenance and inspection are not fixed because they are greatly according to the way in which the customer uses the VCR, and the environment in which the VCR is used. But, in general home use, a good picture will be maintained if the inspection and maintenance is done every 1,000 hours. Table 1 shows the relation between time used per day and inspection period.

Table 1

Average hours used per day	When inspection is necessary		
	About 1 year ↓	About 18 months ↓	About 3 years ↓
One hour			
Two hours			
Three hours			

3. Check before starting Repairs

The faults occurring in the playback picture as shown in Table 2 can be remedied by cleaning and oiling. Check the need for lubrication and the conditions of cleanliness in the unit.
Check with the customer to find out how often the unit is used. If from that you determine that the unit is ready for inspection and maintenance, check the parts shown in Table 2.

Table 2

Phenomenon	Inspection Location
Poor S/N, no color	Dirt on video head or it is degraded
Tape does not run or tape is slack	Dirt on pressure roller, cylinder or in tape transport system
Vertical jitter	Dirt on video head or in tape transport system
Low volume or sound distorted	Dirt on video head or it is degraded
Color beats	Dirt on full erase (FE) head or it is degraded

4. Tools Needed for Inspection and Maintenance

(1) Head cleaning kit
(2) VCR oil and grease (Table 3)
(3) Alcohol
(4) Gauze
(5) Cleaning tape (Dry type)

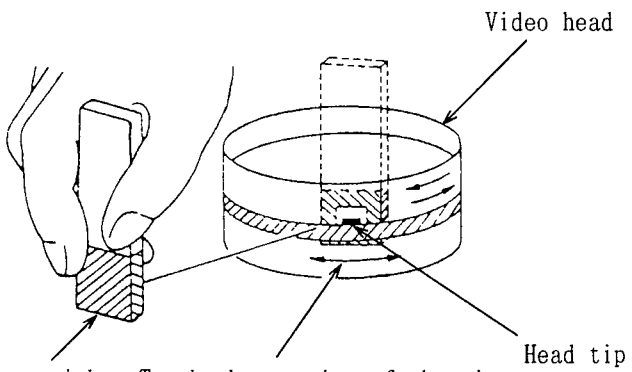
Table 3 Locations for Greasing and Oiling

Name	Oil or Greasing Location
Sonic Slidas Oil (#1600)	Oil low-speed rotating sections
Froil (G31-SAY)	Lubricate metal or molded section under light load
Molicoat (PG-641)	Lubricate metal or molded sections under light load
Lock paint	Fix adjustment screws and nuts.

5. Maintenance Procedures

5-1 Cleaning

(1) Cleaning video head
First use a cleaning tape. Read its instruction sheet carefully before using it. If dirt on head is too stubborn to remove by tape, use the cleaning kit. Moisten the cleaning stick with cleaning fluid at the point indicated.
Touch the stick to the head tip and gently turn the head (rotating cylinder) to the right and left. (Do not move the stick vertically and make sure that only the chamois leather on the stick comes into contact with the head. Otherwise, the head may be damaged.) Thoroughly dry the head. Then test run a tape.
If cleaning fluid remains on the video head, the tape may be damaged when in comes into contact with the head surface.


Video head
Head tip
Coat with cleaning fluid
Touch the section of chamois leather to the head tip and gently turn the head

(2) Cleaning the tape transport system and drive system, etc.

Wipe with gauze moistened with alchol.

Notes: 1) The tape transport system is the system which comes into contact with the running tape. The drive system consists of those parts which run the tape.

2) Make sure that during cleaning you do not touch the tape transport system with the tip of a screwdriver and that no force is applied to the system that could deform it.

5-2 Lubrication

(1) Guide lines for lubricating with oil

Use the oiler to apply one or two drop of Sonic Slidas oil. Make sure not to use too mach oil because it may spill over or leak out coming into contact with rotating parts and causing slippage or other problems. If too much oil is applied, wipe clean with alchohol.

(2) Periodic oil lubrication

Lubricate the specified locations only when replacing components. Refer to the exploded views for the lubricating locations.

5-3 Greasing

(1) Greasing guidelines

Apply grease Froil or Molicoat, with a stick or brush. DO not use excess grease. It may come into contact with the tape transport or drive system. Wipe any excess and clean with gauze moistend with alcohol.

(2) Periodic greasing

Grease the specified locations only when replacing components. Refer to the exploded views for the greasing locations.

Table 4 Parts to be Maintained/Inspected and Maintenance/Inspection Schedules

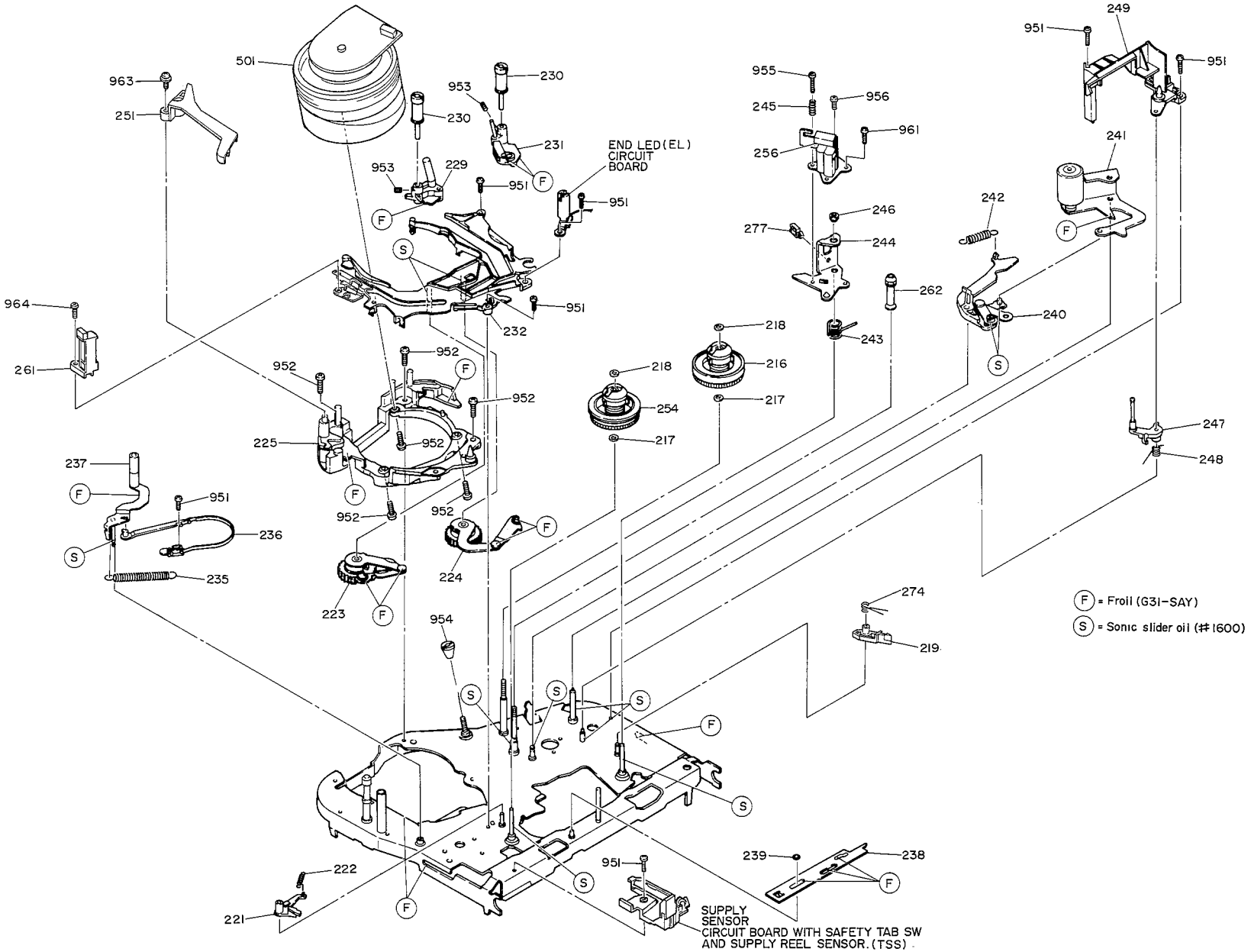
Caution: The following table does not apply to all units. The maintenance/inspection schedules depend on how the unit is used and the environment in which it is used.

Component \ Hours	1000	2000	3000	4000	5000	6000
Video heads (upper cylinder)	C／R	C／R	C／R	C／R	C／R	C／R
Audio/control head	C	C／R	C	R	C	C／R
Full erase head	C	C	C	R	C	C
Supply guide roller	C	C	C	C	C	C
Supply guide pole/post	C	C	C	C	C	C
Take-up guide roller	C	C	C	C	C	C
Take-up guide pole/post	C	C	C	C	C	C
Tension band	——	R	——	R	——	R
Supply reel disk	C	C	C	C	C	C
Take-up reel disk	C	C	C	C	C	C
Impedance roller	C	C	C	C	C	C
Pressure roller	C	R	C	R	C	R
Reel drive belt	C	R	C	R	C	R
Capstan shaft (capstan motor)	C	C／R	C	C／R	C	C／R
Loading motor	——	R	——	R	——	R
Cylinder motor (lower cylinder)	——	R	——	R	——	R

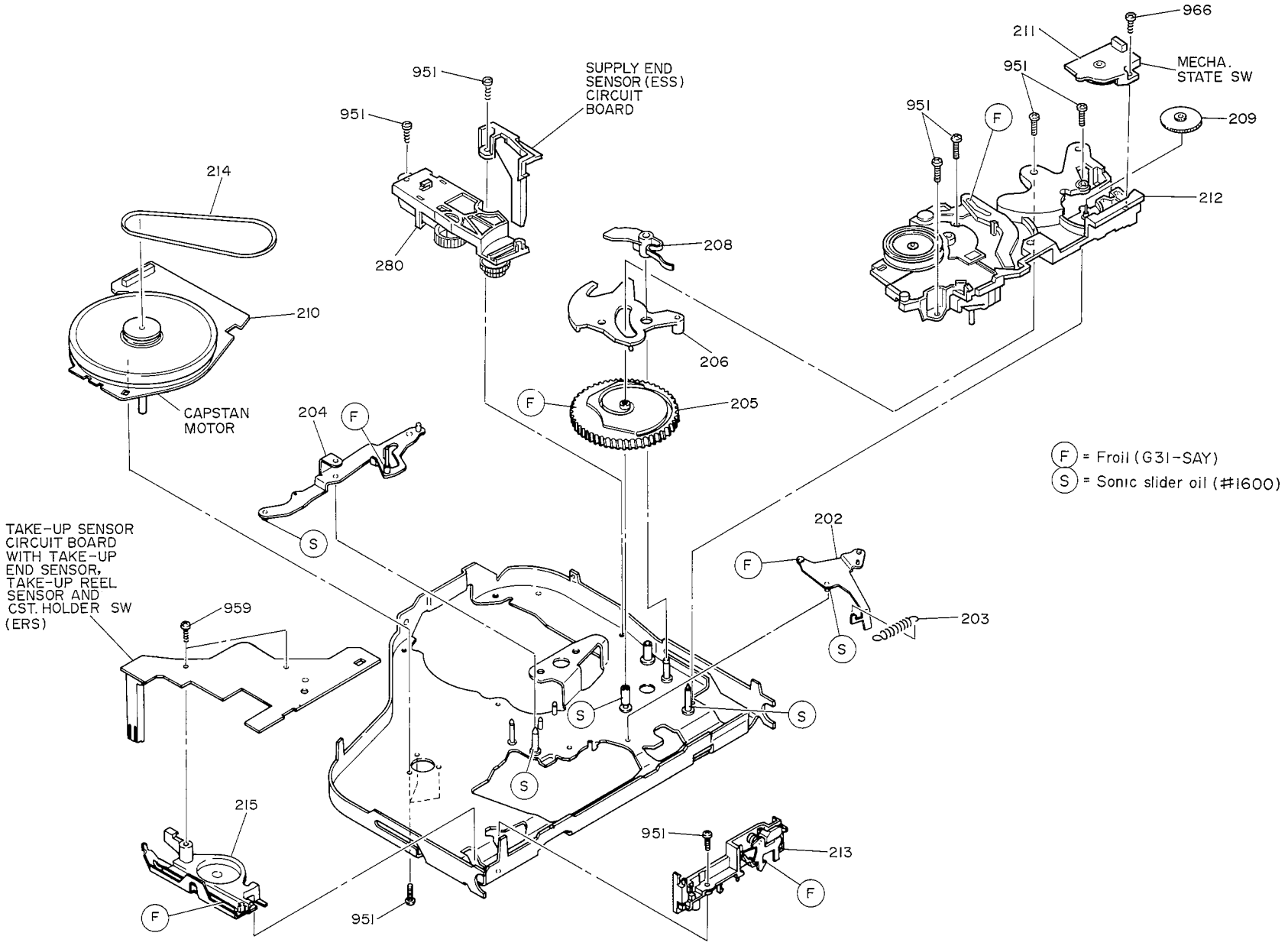
C : Cleaning

R : Parts replacing

1. CHASSIS (TOP VIEW) SECTION



2. CHASSIS (BOTTOM VIEW) SECTION



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